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(30)Priority

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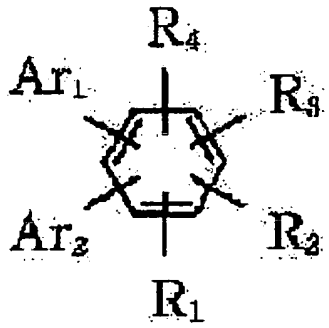
(54) ORGANIC LUMINESCENT ELEMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an organic luminescent element efficiently emitting light having high brightness.

SOLUTION: This organic luminescent element is composed of a pair of electrodes comprising an anode and a cathode; and at least a layer comprising one or a plurality of organic compounds interposed between a pair of electrodes. At least one layer of the layers containing the organic compounds contains at least one kind of condensation polycyclic compounds represented by formula I. In the formula I, R1, R2, R3, R4 represent each a hydrogen atom, an alkyl group, a substituting or non-substituting alalkyl group, a substituting or non- substituting aryl group, a substituting or non-substituting heterocyclic group, a substituting amino group or cyano group. Ar1 and Ar2 represent each a substituting or non-substituting condensation polycyclic aromatic group, or a substituting or non-substituting condensation polycyclic heterocyclic group.

一般式 [I]



LEGAL STATUS

[Date of request for examination]	22.11.2004
[Date of sending the examiner's decision of rejection]	
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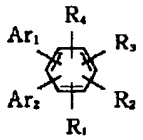
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

* NOTICES *

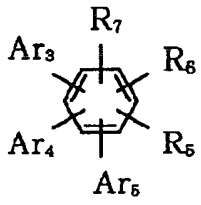
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The organic light emitting device characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [I] in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] for which a kind is contained at least.
[External Character 1]
一般式 [I]

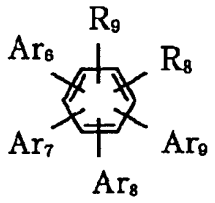


(R1, R2, R3, and R4 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) R1, R2, and R3 And even if R4 is the same, it may differ. Ar1 And Ar2 The condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or] is expressed. Ar1 And Ar2 Even if the same, you may differ.
[Claim 2] The organic light emitting device characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [II] in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] for which a kind is contained at least.
[External Character 2]
一般式 [II]

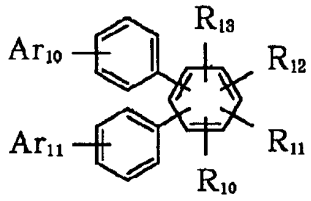


(R5, R6, and R7 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) R5 and R6 And R7 You may differ, even if the same. Ar3 and Ar4 And Ar5 The condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or] is

expressed. Ar3 and Ar4 And Ar5 Even if the same, you may differ.
[Claim 3] The organic light emitting device characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [III] in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] for which a kind is contained at least.
[External Character 3]
一般式 [III]

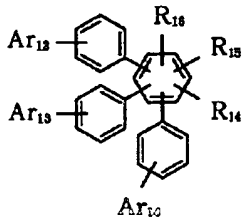


(R8 and R9 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) R8 And R9 You may differ, even if the same. Ar6, Ar7, and Ar8 And Ar9 The condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or] is expressed. Ar6, Ar7, and Ar8 And Ar9 Even if the same, you may differ.
[Claim 4] The organic light emitting device characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [IV] in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] for which a kind is contained at least.
[External Character 4]
一般式 [IV]



(R10, R11, R12, and R13 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) Even if R10, R11, R12, and R13 are the same, they may differ. Ar10 and Ar11 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or]. Even if Ar10 and Ar11 are the same, they may differ.
[Claim 5] The organic light emitting device characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [V] in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] for which a kind is contained at least.
[External Character 5]

一般式 [V]

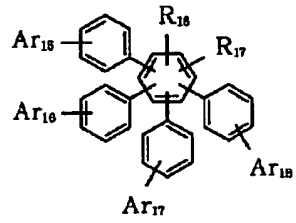


(R14, R15, and R16 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) Even if R14, R15, and R16 are the same, they may differ. Ar12, Ar13, and Ar14 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or]. Even if Ar12, Ar13, and Ar14 are the same, they may differ.

[Claim 6] The organic light emitting device characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [VI] in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] for which a kind is contained at least.

[External Character 6]

一般式 [VI]

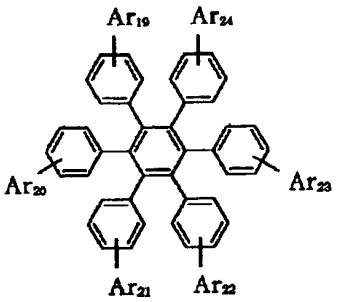


(R17 and R18 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) Even if R17 and R18 are the same, they may differ. Ar15, Ar16, Ar17, and Ar18 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or]. Even if Ar15, Ar16, Ar17, and Ar18 are the same, they may differ.

[Claim 7] The organic light emitting device characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [VII] in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] for which a kind is contained at least.

[External Character 7]

一般式 [VII]



(Ar19, Ar20, Ar21, Ar22, Ar23, and Ar24 express among a formula the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or / a permutation, or].) Even if Ar19, Ar20, Ar21, Ar22, Ar23, and Ar24 are the same, they may differ.

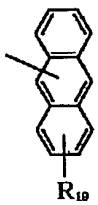
[Claim 8] An organic light emitting device given in claim 1 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical which the three or more benzene rings which are not permuted [a permutation or] condensed thru/or one term of 7.

[Claim 9] An organic light emitting device given in claim 1 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical which the four or more benzene rings which are not permuted [a permutation or] condensed thru/or one term of 7.

[Claim 10] The organic light emitting device according to claim 8 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [VIII].

[External Character 8]

一般式 [VIII]

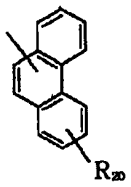


(R19 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)

[Claim 11] The organic light emitting device according to claim 8 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [IX].

[External Character 9]

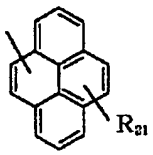
一般式 [IX]



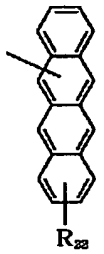
(R20 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)

[Claim 12] The organic light emitting device according to claim 8 or 9 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [X].

[External Character 10]
一般式 [X]

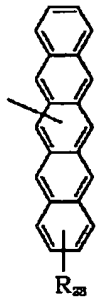


(R21 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
[Claim 13] The organic light emitting device according to claim 8 or 9 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [XI].
[External Character 11]
一般式 [XI]



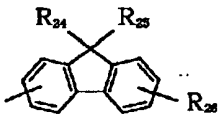
(R22 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
[Claim 14] The organic light emitting device according to claim 8 or 9 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [XII].

[External Character 12]
一般式 [XII]



(R23 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
[Claim 15] An organic light emitting device given in claim 1 whose Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [XIII] thru/or one term of 7.
[External Character 13]

一般式 [XIII]

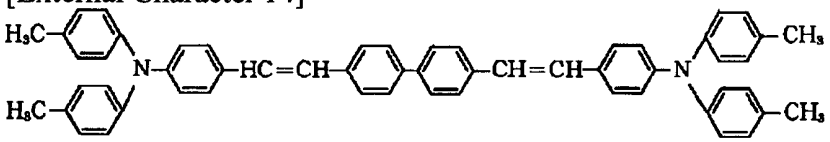


(R24, R25, and R26 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)

[Claim 16] An organic light emitting device given in claim 1 to which an electronic transportation layer or a luminous layer is characterized by the thing of the condensed multi-ring compound shown by the general formula [I] thru/or the general formula [VII] for which a kind is contained at least at least among the layers which consist of an organic compound thru/or one term of 7.

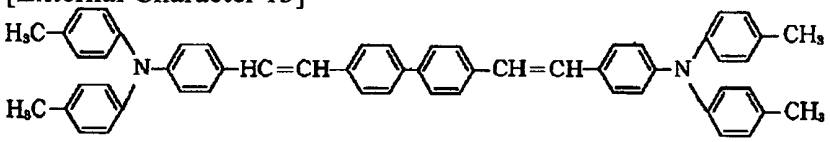
[Claim 17] The organic light emitting device according to claim 1 to 7 to which a luminous layer is characterized by containing the compound of the condensed multi-ring compound shown by the general formula [I] thru/or the general formula [VII] shown with a kind and the following structure expression at least at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[External Character 14]



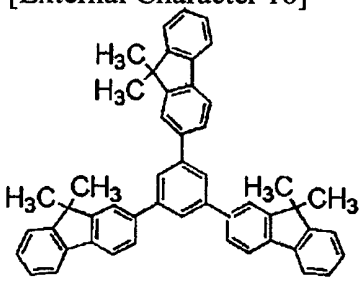
[Claim 18] In the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair] The organic light emitting device according to claim 1 to 7 characterized by for a hole transportation layer containing a hole transportation ingredient and a yellow luminescent material, and containing the compound of the condensed multi-ring compound in which a luminous layer is shown by the general formula [I] thru/or the general formula [VII] shown with a kind and the following structure expression at least.

[External Character 15]



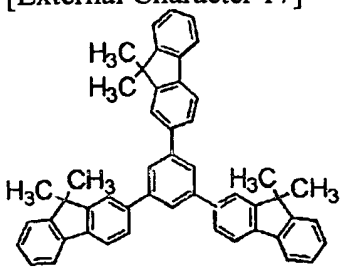
[Claim 19] The condensed multi-ring compound shown with the following structure expression.

[External Character 16]

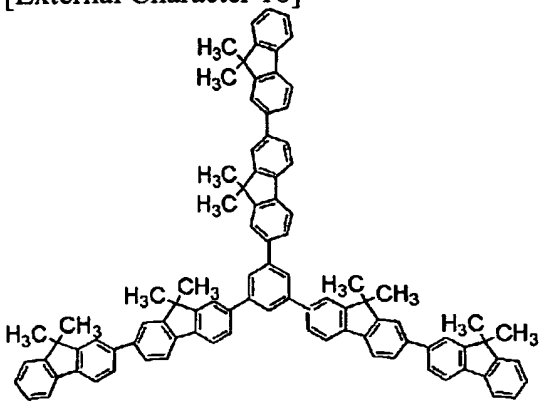


[Claim 20] The organic light emitting device to which an electronic transportation layer or a luminous layer is characterized by containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer

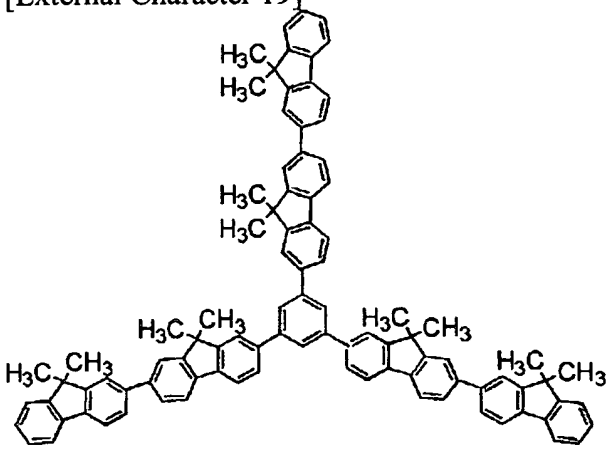
which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[External Character 17]



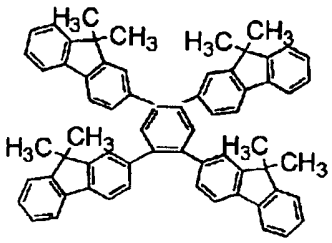
[Claim 21] The condensed multi-ring compound shown with the following structure expression.
[External Character 18]



[Claim 22] The organic light emitting device to which an electronic transportation layer or a luminous layer is characterized by containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[External Character 19]

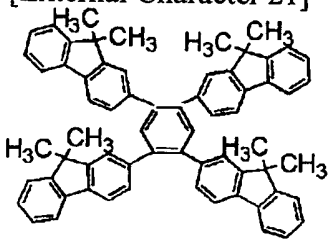


[Claim 23] The condensed multi-ring compound shown with the following structure expression.
[External Character 20]



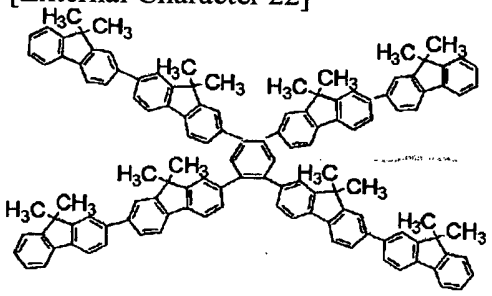
[Claim 24] The organic light emitting device to which an electronic transportation layer or a luminous layer is characterized by containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[External Character 21]



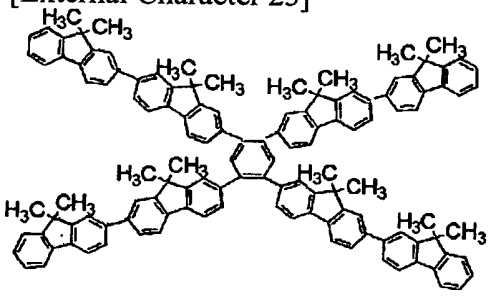
[Claim 25] The condensed multi-ring compound shown with the following structure expression.

[External Character 22]



[Claim 26] The organic light emitting device to which an electronic transportation layer or a luminous layer is characterized by containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[External Character 23]



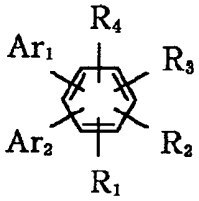
[Translation done.]

* NOTICES *

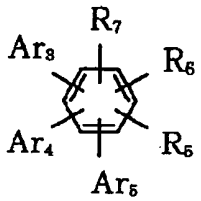
DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the organic light emitting device using a new organic compound and new it.
[0002]
[Description of the Prior Art] An organic light emitting device is a component using the light emitted in case the exciton of a fluorescence compound is made to generate and this exciton returns to a ground state by making the thin film containing a fluorescence organic compound pinch, and pouring in an electron and a hole (electron hole) from each electrode between an anode plate and cathode.
[0003] It sets to about [10V] applied voltage with the component of the functional discrete-type two-layer configuration which used ITO for the anode plate, used the alloy of magnesium silver for cathode in research ("Appl.Phys.Lett." 51,913 (1987)) of KODAKKU in 1987, respectively, and used the triphenylamine derivative for the hole transportation ingredient, use an aluminum quinolinol complex as an electronic transportation ingredient and a luminescent material, and they are 1000 cd/m2. Luminescence of extent is report. As a patent of relation, U.S. Pat. No. 4, No. 539 or 507, U.S. Pat. No. 4,720,432, a U.S. Pat. No. 4,885,211 number, etc. are mentioned.
[0004] Moreover, by changing the class of fluorescence organic compound, luminescence from ultraviolet to infrared rays is possible, and, recently, research of various compounds is done actively. For example, it is indicated by a U.S. Pat. No. 5,151,629 number, a U.S. Pat. No. 5,409,783 number, a U.S. Pat. No. 5,382,477 number, JP,2-247278,A, JP,3-255190,A, JP,5-202356,A, JP,9-202878,A, JP,9-227576,A, etc.
[0005] Furthermore, the organic light emitting device which used the conjugated-system giant molecule other than an organic light emitting device using the above low-molecular ingredients is reported by the group ("Nature", 347,539 (1990)) of Cambridge University. By this report, luminescence is checked by the monolayer by forming polyphenylene vinylene (PPV) by the coating system.
[0006] As a related patent of the organic light emitting device using a conjugated-system macromolecule, a U.S. Pat. No. 5,247,190 number, a U.S. Pat. No. 5,514,878 number, a U.S. Pat. No. 5,672,678 number, JP,4-145192,A, JP,5-247460,A, etc. are mentioned.
[0007] Thus, the latest advance in an organic light emitting device is remarkable, and the description has suggested the possibility from the versatility of high brightness and luminescence wavelength, high-speed responsibility, a thin shape, and the lightweight formation of a luminescence device being possible to an extensive application with low applied voltage.
[0008] However, the further optical output or the high conversion efficiency of high brightness is required of the present condition. Moreover, there are still many problems in respect of endurance, such as degradation (a dark spot should arise owing to leak of a current etc.) by an ambient atmosphere gas, moisture, etc. containing aging about the brightness by use of long duration, or oxygen. Still full color Although luminescence of the good blue of the color purity at the time of considering the application to a display etc., green, and red is needed, still, it is not enough about these problems.
[0009] As a fluorescence organic compound used for an electronic transportation layer, a luminous layer, etc., many aromatic compounds and condensed multi-ring aromatic compounds are studied. For example, although JP,4-68076,A,

JP,5-32966,A, JP,6-228552,A, JP,6-240244,A, JP,7-109454,A, JP,8-311442,A, JP,9-241629,A, JP,2000-26334,A, JP,2000-268964,A, etc. are mentioned, what luminescence brightness and endurance can fully satisfy is not obtained.
[0010]
[Problem(s) to be Solved by the Invention] the purpose of this invention is made in view of such a technique -- having -- a condensed multi-ring compound [****] -- using -- very -- efficient -- high -- it is in offering the organic light emitting device which has a brightness optical output. Moreover, it is in offering an extremely durable organic light emitting device. It is in offering the organic light emitting device which manufacture can furthermore create comparatively cheaply easily.
[0011]
[Means for Solving the Problem] The organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [I] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0012]
[External Character 24]
一般式 [I]

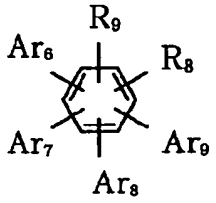


[0013] (R1, R2, R3, and R4 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) R1, R2, and R3 And even if R4 is the same, it may differ. Ar1 And Ar2 The condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or] is expressed. Ar1 And Ar2 Even if the same, you may differ.
Moreover, the organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [II] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0014]
[External Character 25]
一般式 [II]

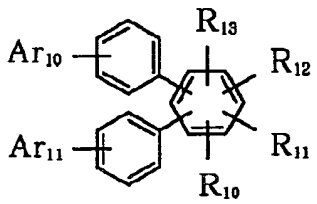


[0015] (R5, R6, and R7 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) R5 and R6 And R7 You may differ, even if the same. Ar3 and Ar4 And Ar5 The condensed multi-ring heterocycle radical which is not permuted

[the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or] is expressed. Ar3 and Ar4 And Ar5 Even if the same, you may differ.
Moreover, the organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [III] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0016]
[External Character 26]
一般式 [III]

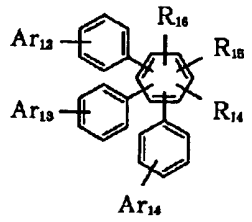


[0017] (R8 and R9 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) R8 And R9 You may differ, even if the same. Ar6, Ar7, and Ar8 And Ar9 The condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or] is expressed. Ar6, Ar7, and Ar8 And Ar9 Even if the same, you may differ.
Moreover, the organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [IV] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0018]
[External Character 27]
一般式 [IV]

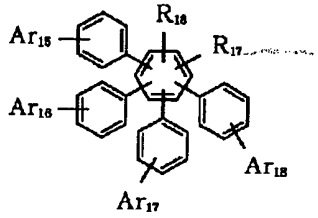


[0019] (R10, R11, R12, and R13 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) Even if R10, R11, R12, and R13 are the same, they may differ. Ar10 and Ar11 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or]. Even if Ar10 and Ar11 are the same, they may differ.
Moreover, the organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [V] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[0020]
[External Character 28]
一般式 [V]

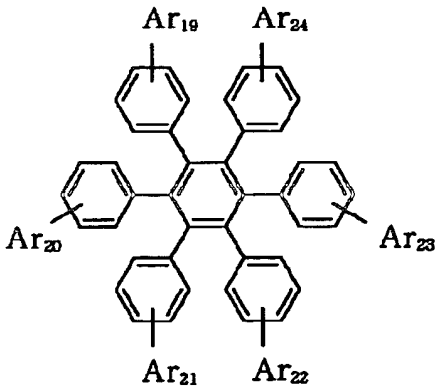


[0021] (R14, R15, and R16 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) Even if R14, R15, and R16 are the same, they may differ. Ar12, Ar13, and Ar14 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or]. Even if Ar12, Ar13, and Ar14 are the same, they may differ.
Moreover, the organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [VI] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0022]
[External Character 29]
一般式 [VI]

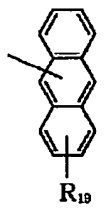


[0023] (R17 and R18 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.) Even if R17 and R18 are the same, they may differ. Ar15, Ar16, Ar17, and Ar18 express the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or /, a permutation, or]. Even if Ar15, Ar16, Ar17, and Ar18 are the same, they may differ.
Moreover, the organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the following general formula [VII] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0024]
[External Character 30]

一般式 [VII]

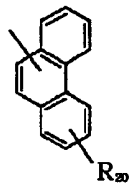


[0025] (Ar19, Ar20, Ar21, Ar22, Ar23, and Ar24 express among a formula the condensed multi-ring heterocycle radical which is not permuted [the condensed multi-ring aromatic series radical which is not permuted / a permutation or / a permutation, or].) Even if Ar19, Ar20, Ar21, Ar22, Ar23, and Ar24 are the same, they may differ.
As for the organic light emitting device of this invention, it is desirable that Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical which the three or more benzene rings which are not permuted [a permutation or] condensed.
[0026] As for the organic light emitting device of this invention, it is more desirable that Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical which the four or more benzene rings which are not permuted [a permutation or] condensed.
[0027] As for the organic light emitting device of this invention, it is desirable that Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [VIII].
[0028]
[External Character 31]
一般式 [VIII]

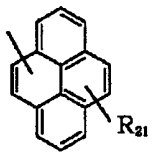


[0029] (R19 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
As for the organic light emitting device of this invention, it is desirable that Ar1-Ar24 of a general formula [I] - a general formula [VII] are the condensed multi-ring aromatic series radical shown by the following general formula [IX].
[0030]
[External Character 32]

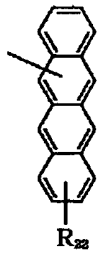
一般式 [IX]



[0031] (R20 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
As for the organic light emitting device of this invention, it is desirable that Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [X].
[0032]
[External Character 33]
一般式 [X]



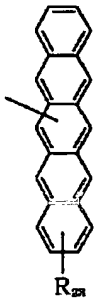
[0033] (R21 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
As for the organic light emitting device of this invention, it is desirable that Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [XI].
[0034]
[External Character 34]
一般式 [XI]



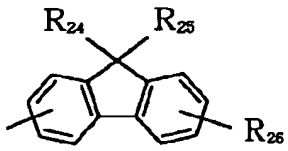
[0035] (R22 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
As for the organic light emitting device of this invention, it is desirable that Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [XII].

[0036]
[External Character 35]

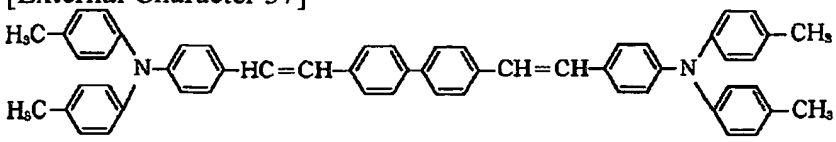
一般式 [XII]



[0037] (R23 expresses among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
As for the organic light emitting device of this invention, it is desirable that Ar1 -Ar24 of a general formula [I] - a general formula [VII] is the condensed multi-ring aromatic series radical shown by the following general formula [XIII].
[0038]
[External Character 36]
一般式 [XIII]



[0039] (R24, R25, and R26 express among a formula the heterocycle radical which is not permuted [the aryl group which is not permuted / the aralkyl radical which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or /, a permutation, or], the permutation amino group, or a cyano group.)
The organic light emitting device of this invention has at least the desirable thing of the condensed multi-ring compound in which an electronic transportation layer or a luminous layer is shown by the general formula [I] thru/or the general formula [VII] for which a kind is contained at least among the layers which consist of an organic compound.
[0040] The organic light emitting device of this invention is characterized by a luminous layer containing the compound of the condensed multi-ring compound shown by the general formula [I] thru/or the general formula [VII] shown with a kind and the following structure expression at least at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0041]
[External Character 37]

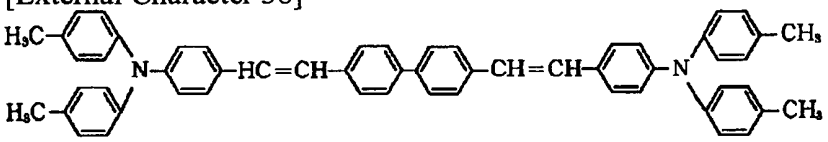


[0042] The organic light emitting device of this invention is characterized by for a hole transportation layer to contain a hole transportation ingredient and a yellow luminescent material, and to contain the compound of the condensed-multi-ring compound in which a luminous layer is shown by the general formula [I] thru/or the general formula [VII] shown with a kind and the following structure expression at least in the organic light emitting device which has at least the

layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[0043]

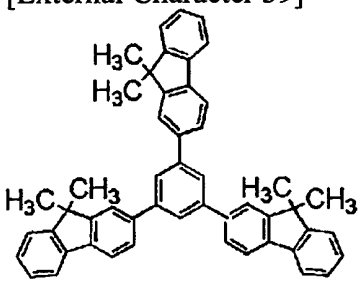
[External Character 38]



[0044] Moreover, this invention is a condensed multi-ring compound shown with the following structure expression.

[0045]

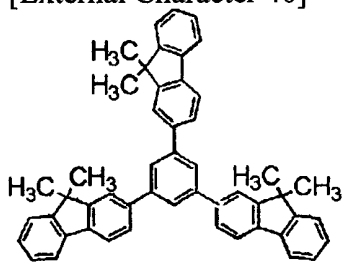
[External Character 39]



[0046] Moreover, the organic light emitting device of this invention is characterized by an electronic transportation layer or a luminous layer containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[0047]

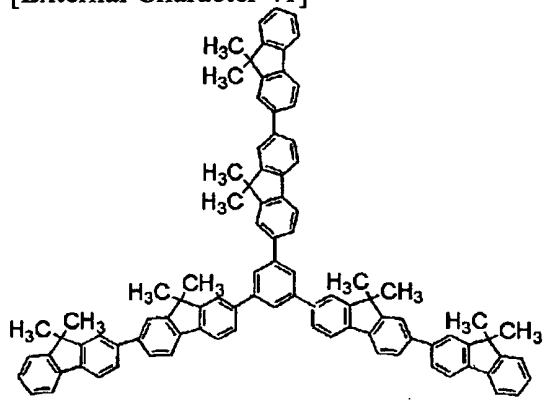
[External Character 40]



[0048] Moreover, this invention is a condensed multi-ring compound shown with the following structure expression.

[0049]

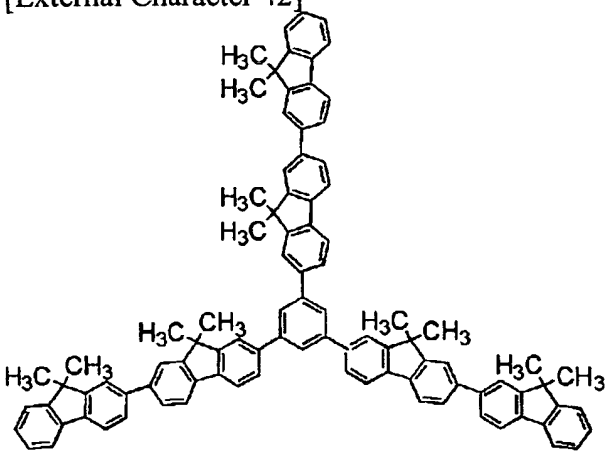
[External Character 41]



[0050] Moreover, the organic light emitting device of this invention is characterized by an electronic transportation layer or a luminous layer containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[0051]

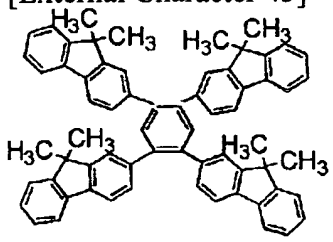
[External Character 42]



[0052] Moreover, this invention is a condensed multi-ring compound shown with the following structure expression.

[0053]

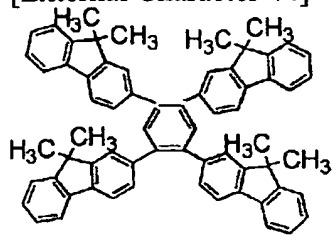
[External Character 43]



[0054] Moreover, the organic light emitting device of this invention is characterized by an electronic transportation layer or a luminous layer containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].

[0055]

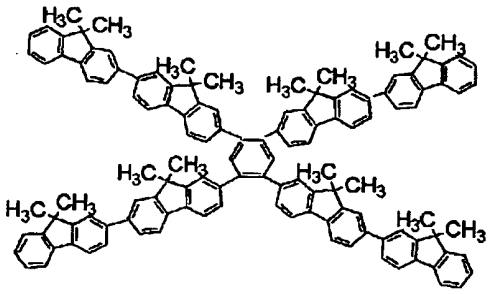
[External Character 44]



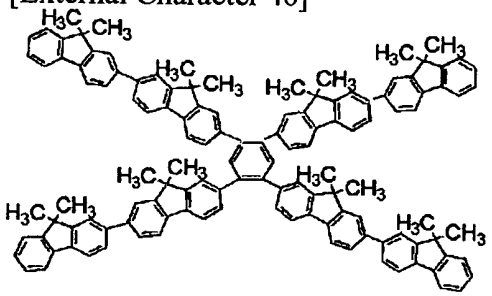
[0056] Moreover, this invention is a condensed multi-ring compound shown with the following structure expression.

[0057]

[External Character 45]



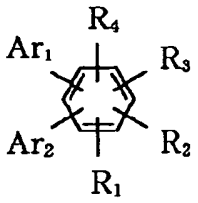
[0058] Moreover, the organic light emitting device of this invention is characterized by an electronic transportation layer or a luminous layer containing the condensed multi-ring compound shown with the following structure expression at least among the layers containing said organic compound in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0059]
[External Character 46]



[0060]
[Embodiment of the Invention] Hereafter, this invention is explained to a detail.
[0061] The organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound of this invention in which at least one layer of the layers containing said organic compound is shown by the above-mentioned general formula [I] - the general formula [VII] for which a kind is contained at least in the organic light emitting device which has at least the layer which consists of an electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were pinched by inter-electrode [of this pair].
[0062] The example of the substituent of R1 -R26 in the above-mentioned general formula [I] - a general formula [VII] and Ar1 -Ar24 is shown below.
[0063] As an alkyl group, a methyl group, an ethyl group, n-propyl group, an iso-propyl group, n-butyl, ter-butyl, an octyl radical, etc. are mentioned.
[0064] Benzyl, a phenethyl radical, etc. are mentioned as an aralkyl radical.
[0065] As an aryl group, a phenyl group, a biphenyl radical, a terphenyl radical, etc. are mentioned.
[0066] As a heterocycle radical, a thienyl group, a pyrrolyl radical, a pyridyl radical, a quinolyl radical, a carbazolyl radical, an oxazolyl radical, an oxadiazolyl radical, a thiazolyl radical, a thiadiazolyl radical, a TACHI enyl radical, a TAPIRORIRU radical, etc. are mentioned. In addition, the condensed ring is not included in these aryl groups and a heterocycle radical.
[0067] As a permutation amino group, a dimethylamino radical, a diethylamino radical, a dibenzylamino radical, a diphenylamino radical, a ditolylamino radical, the JIANISORIRU amino group, etc. are mentioned.
[0068] A hydrogen atom and a cyano group are mentioned.
[0069] As a condensed multi-ring aromatic series radical, a naphthyl group, an anthracenyl group, a phenan friction mark nil radical, a pyrenyl radical, a tetra-SENIRU radical, a pen TASENIRU radical, a fluorenyl group, a TORIFE elm nil radical, a peri RENIRU radical, etc. are mentioned, and the radical preferably shown by said general formula [VIII] - [XIII] is mentioned.
[0070] as a condensed multi-ring heterocycle radical -- an acridinyl radical and full -- me -- a nonyl radical etc. is

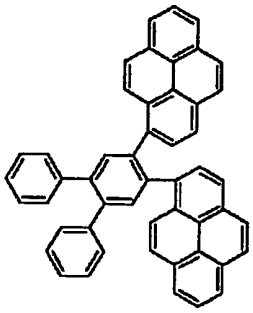
mentioned.
[0071] As a substituent which the above-mentioned substituent may have, alkyl groups, such as a methyl group, an ethyl group, and a propyl group, Aralkyl radicals, such as benzyl and a phenethyl radical, a phenyl group, a naphthyl group, An anthryl radical, a phenan thrill radical, a pyrenyl radical, a tetra-SENIRU radical, a pen TASENIRU radical, Heterocycle radicals, such as aryl groups, such as a fluorenyl group, a thienyl group, a pyrrolyl radical, and a pyridyl radical, A dimethylamino radical, a diethylamino radical, a dibenzylamino radical, a diphenylamino radical, Alkoxyl groups, such as amino groups, such as a ditolylamino radical and a JIANISORIRU amino group, a methoxyl group, ethoxyl, propoxyl, and a phenoxyl radical, a cyano group, a nitro group, etc. are mentioned.
[0072] Next, although the example of representation of the condensed multi-ring compound of this invention is given to below, this invention is not limited to these.
[0073]
[External Character 47]
[化合物例]

一般式［Ｉ］



[0074]
[External Character 48]

1



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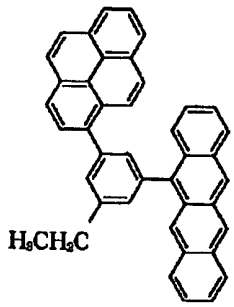

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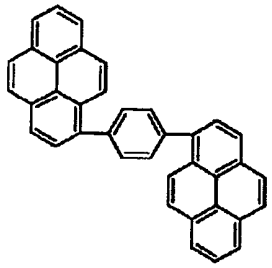

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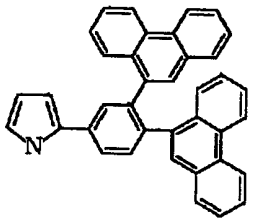

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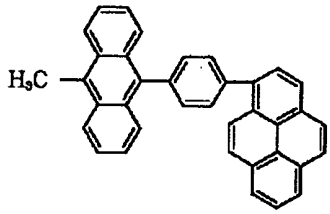

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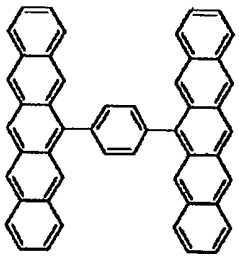
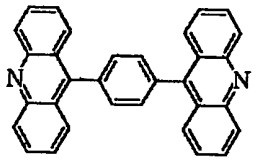


[0075]
[External Character 49]

7



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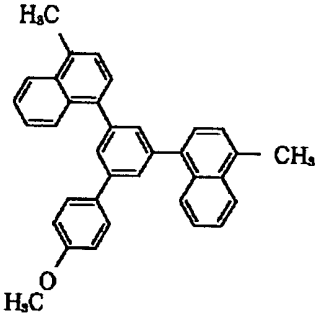
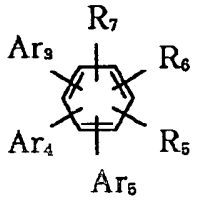


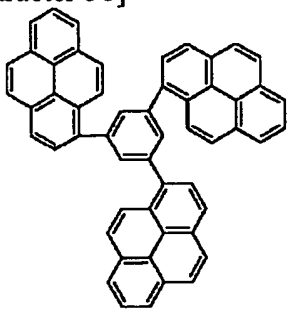
[0076]
[External Character 50]

一般式［II］



[0077]
[External Character 51]

9



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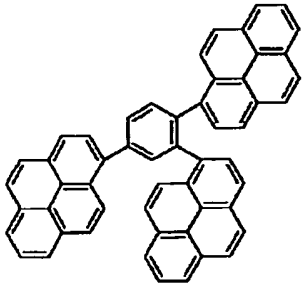

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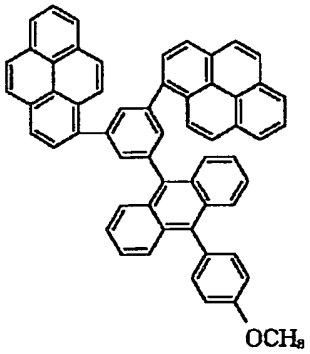
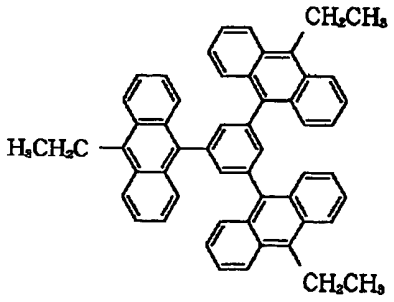
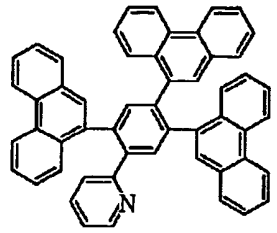
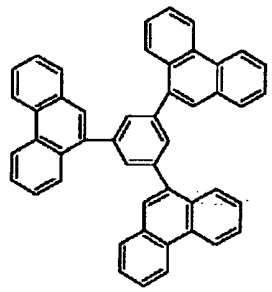


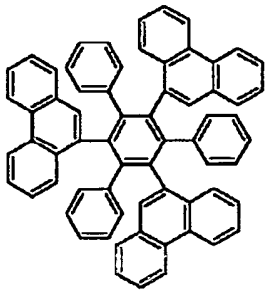
[0078]
[External Character 52]

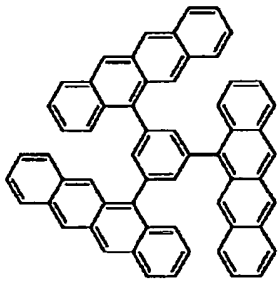
12 

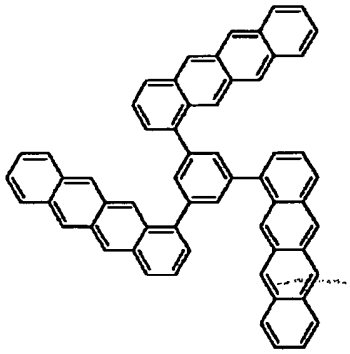
13 

14 

[0079]
[External Character 53]

15 

16 

17 

[0080]
[External Character 54]

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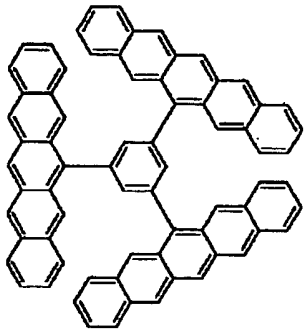

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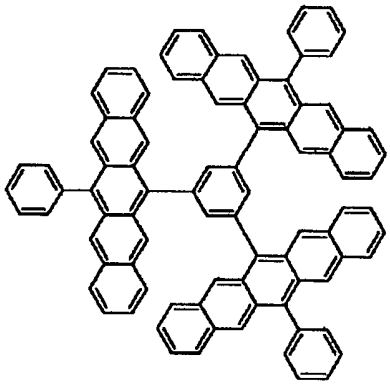

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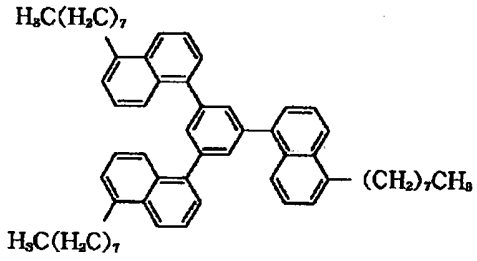

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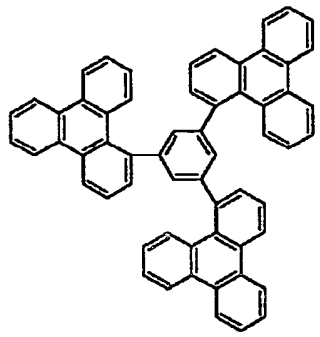
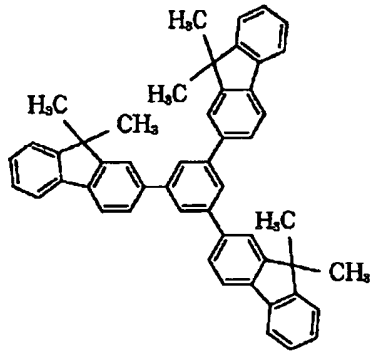
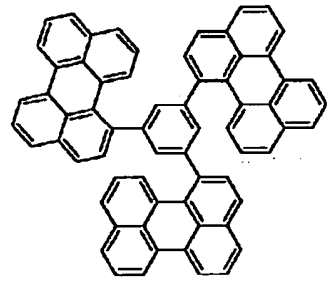
21 

22 

23 

[0082]
[External Character 56]

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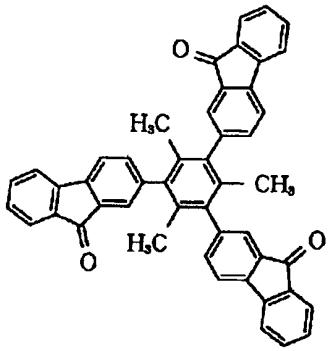

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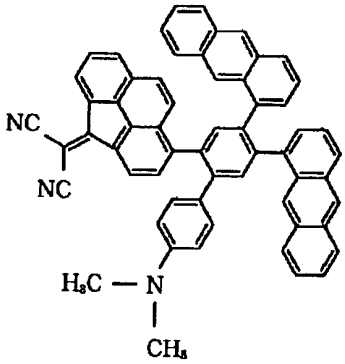

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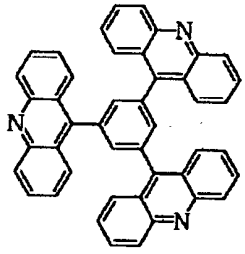

[0083]
[External Character 57]

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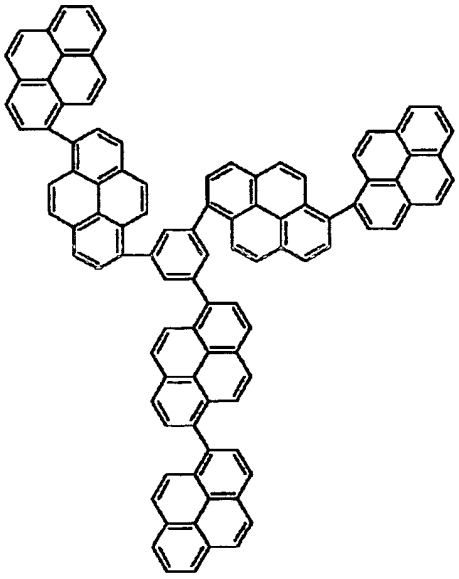

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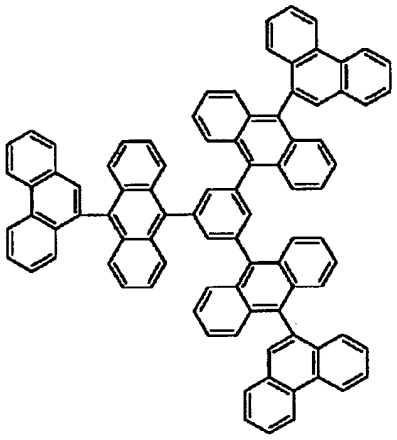
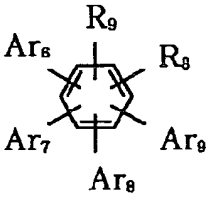
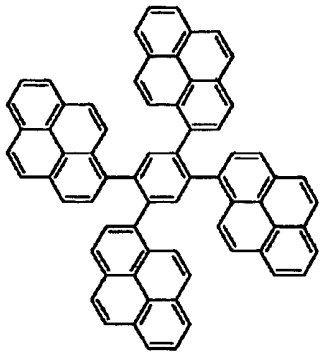
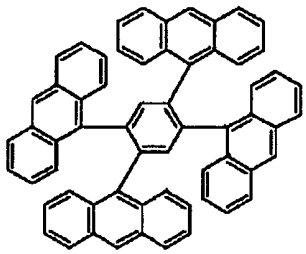


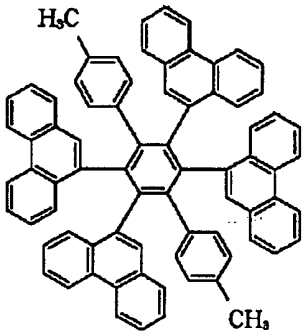
[0084]
[External Character 58]
一般式［III］



[0085]
[External Character 59]

29 

30 

31 

[0086]
[External Character 60]

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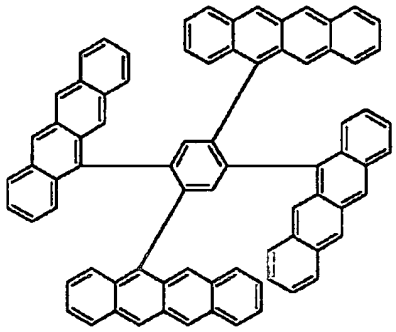

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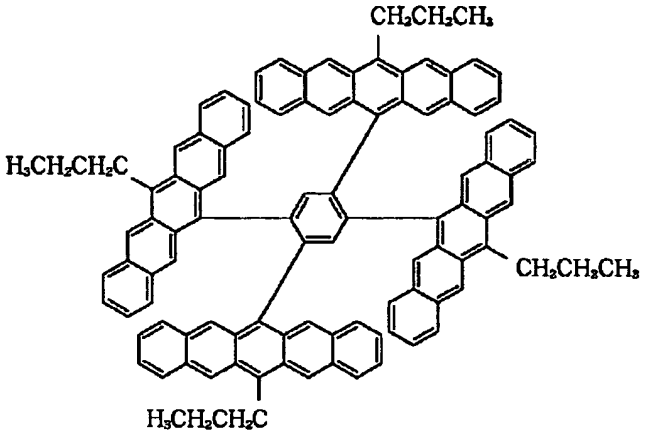

[0087]
[External Character 61]

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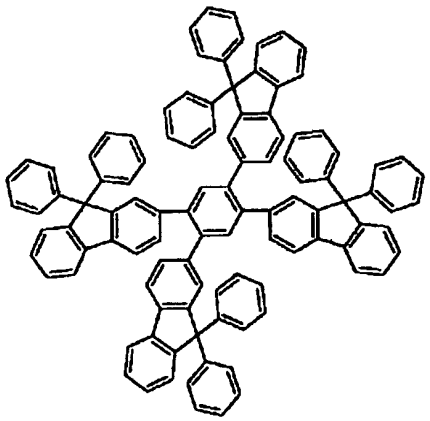

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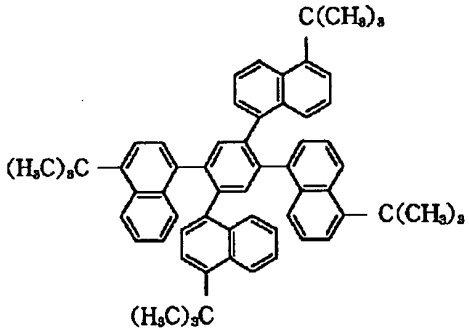

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[External Character 62]

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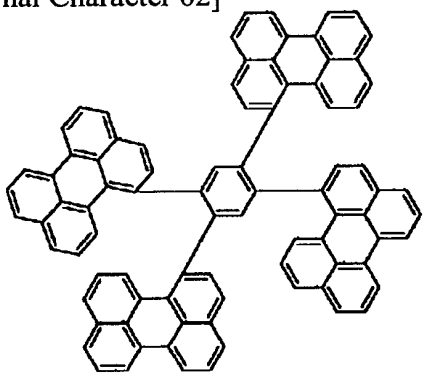

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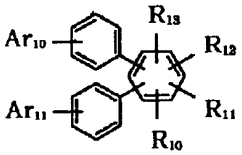
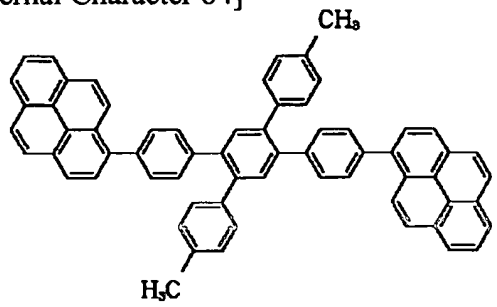
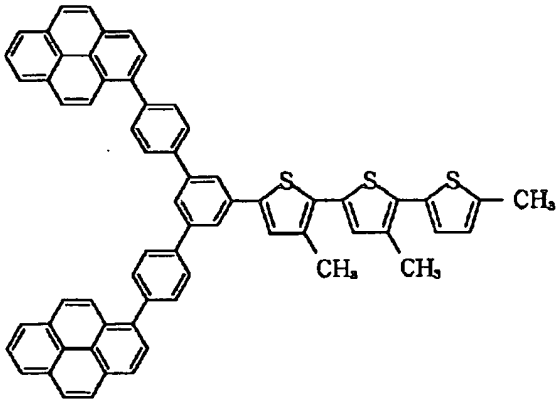
一般式［IV］

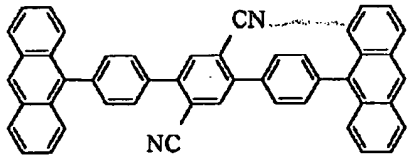


[0090]

[External Character 64]

37 

38 

39 

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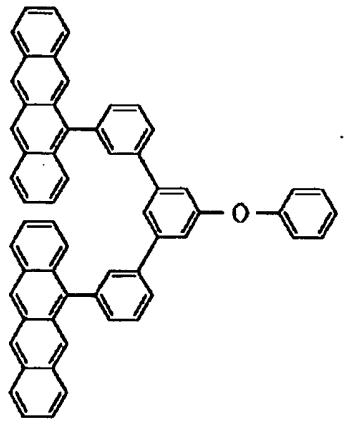

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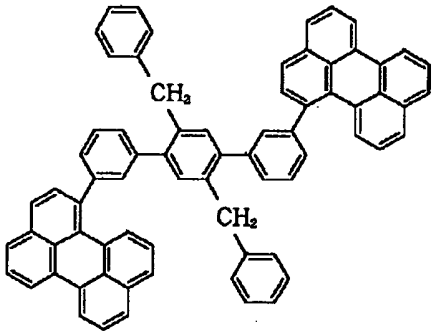

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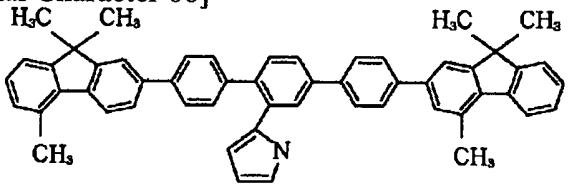
[External Character 66]

42



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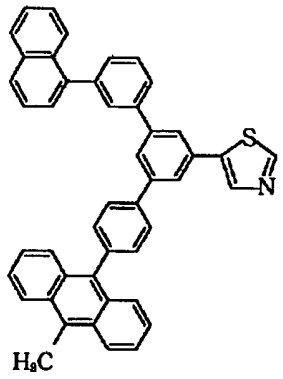
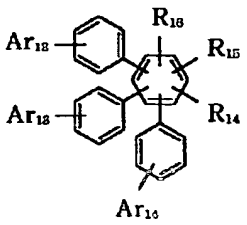


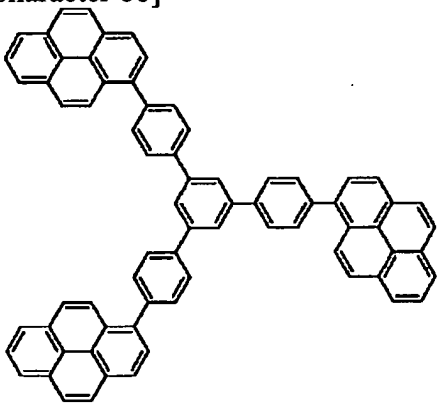
[0093]
[External Character 67]

一般式［Ｖ］



[0094]
[External Character 68]

44



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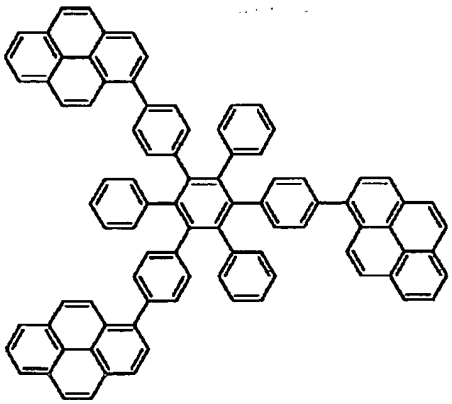
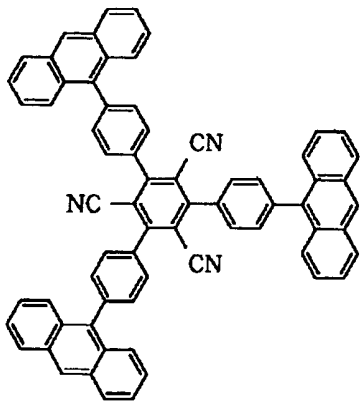


[0095]
[External Character 69]

46



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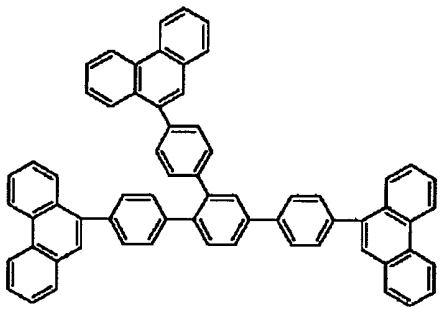
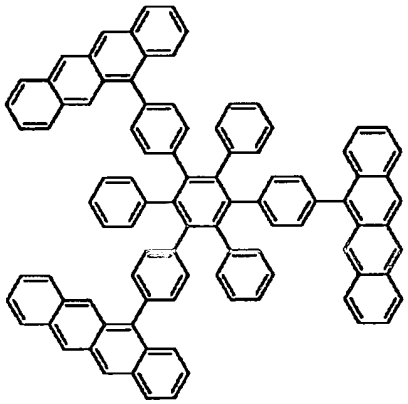


[0096]
[External Character 70]

48



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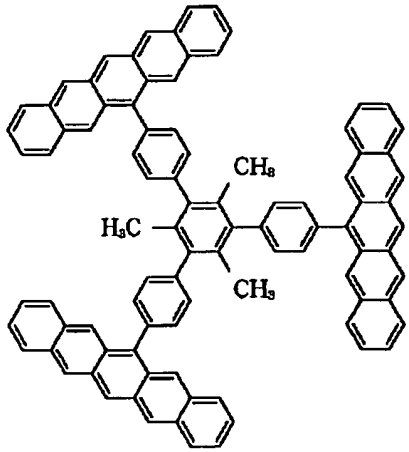
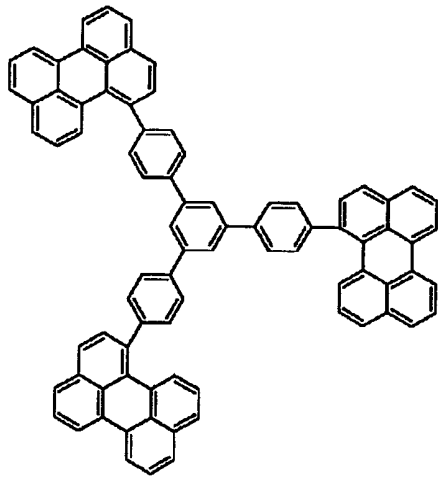


[0097]
[External Character 71]

50



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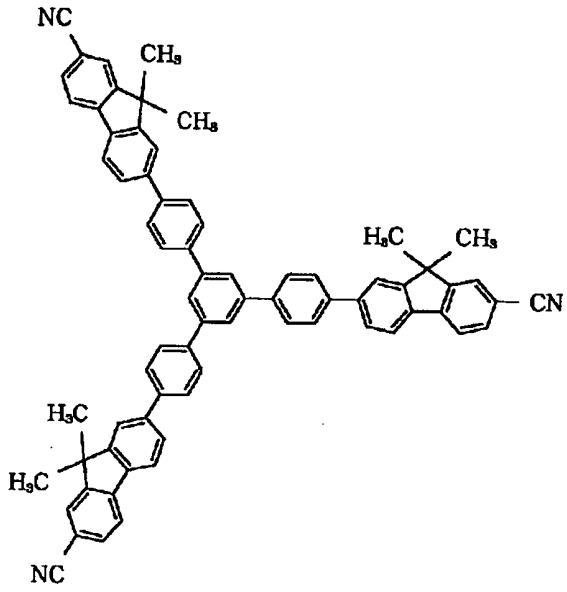
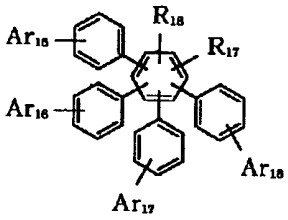
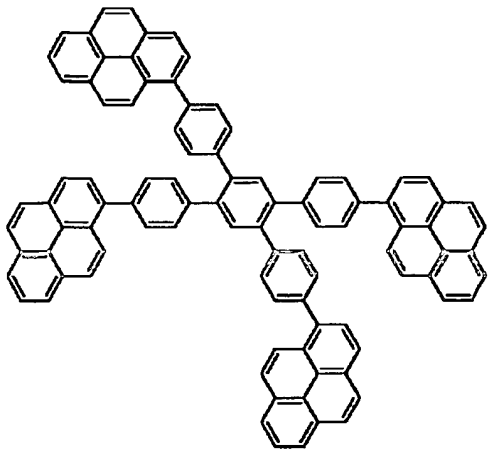


[0098]
[External Character 72]
一般式 [VI]



[0099]
[External Character 73]

52



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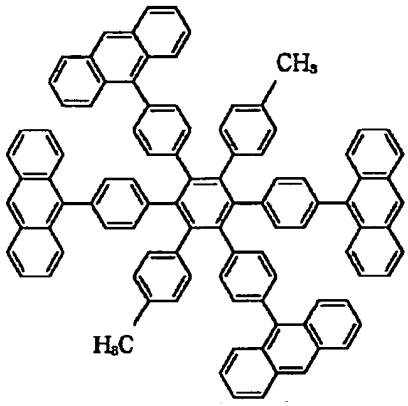

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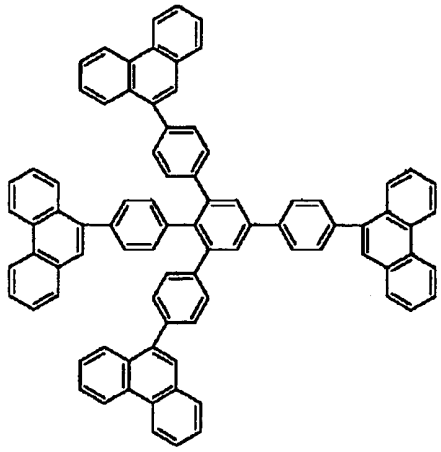

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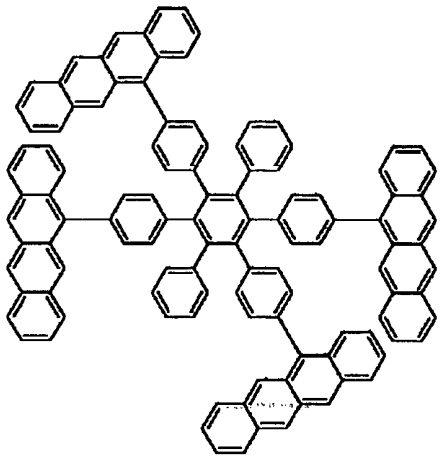

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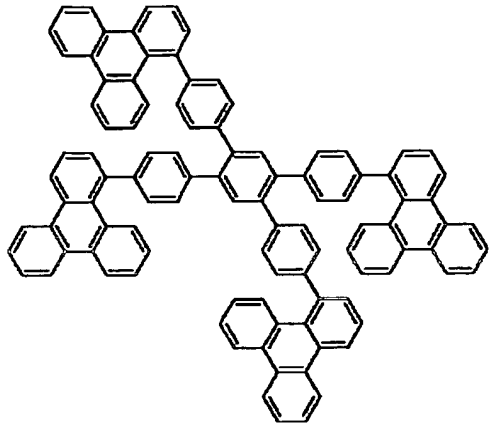

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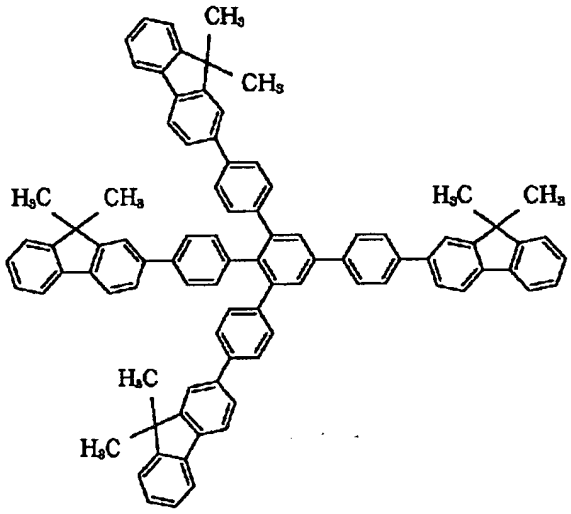
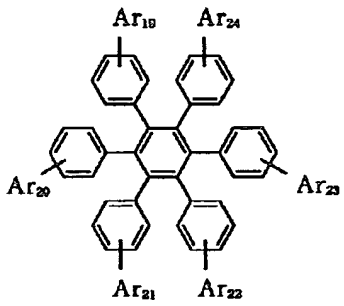


[0102]
[External Character 76]
一般式 [VII]



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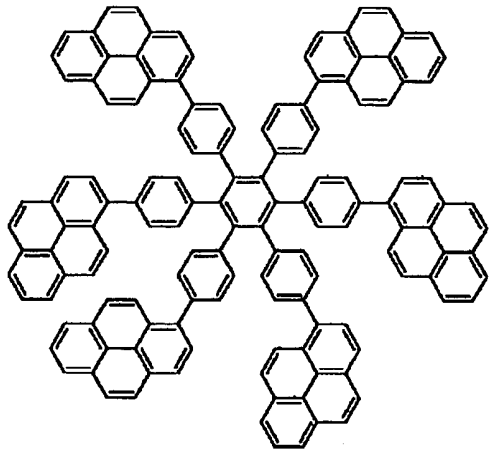

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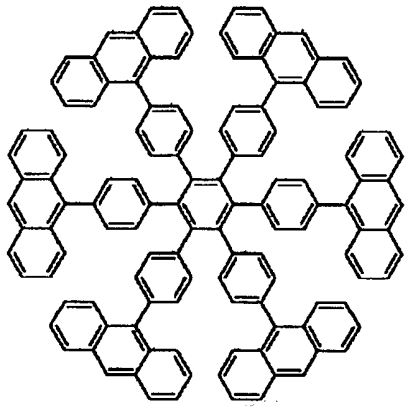

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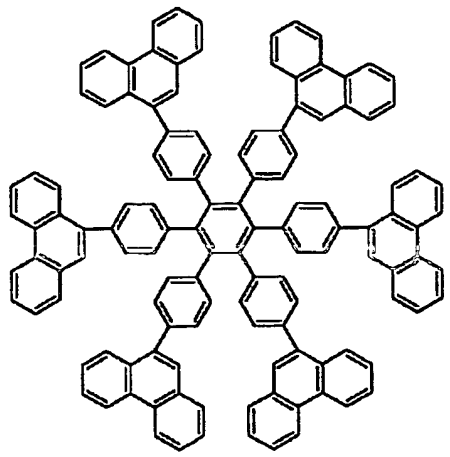

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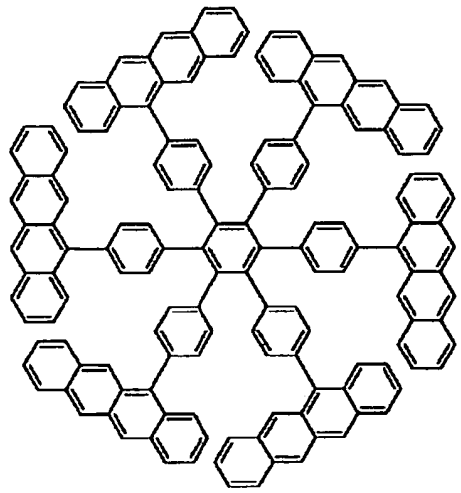

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[External Character 79]

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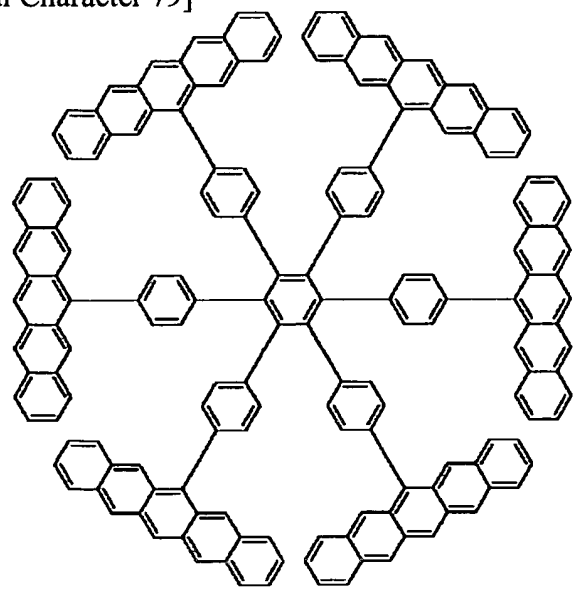

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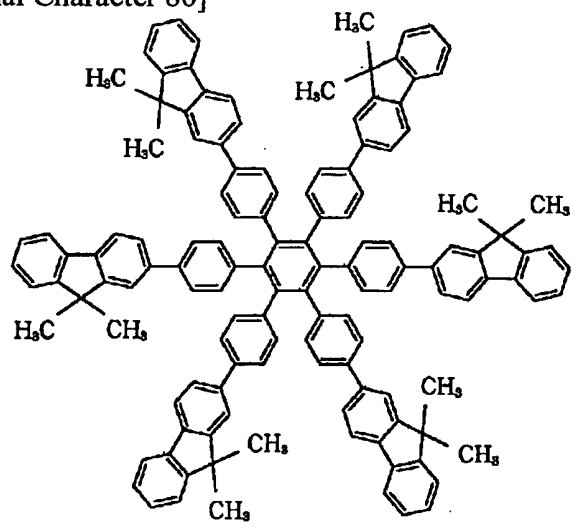
63 

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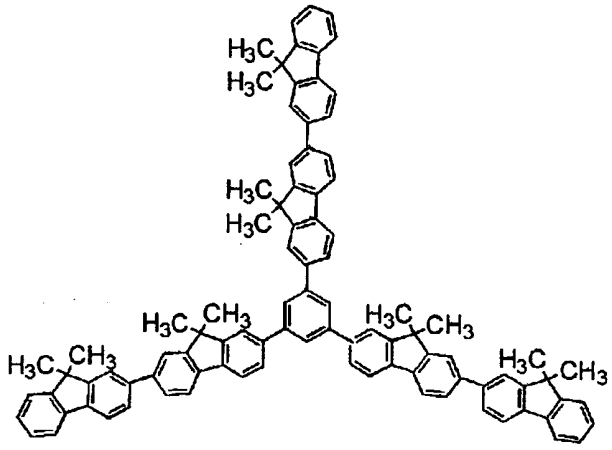
[External Character 81] 64 

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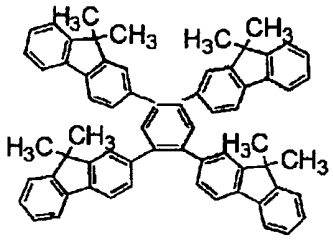
[External Character 82] 65 

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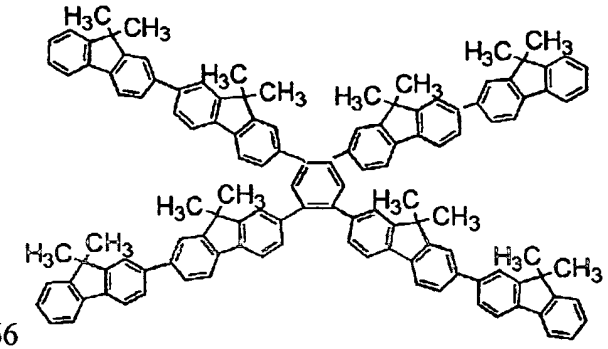


[External Character 83] 66

[0110] The condensed multi-ring compound of this invention is compoundable by the approach generally learned. The suzuki coupling method using the palladium catalyst for example, (for example, "Chem.Rev." 1995, 95, 2457 -2483), The Yamamoto method using a nickel catalyst (2091 for example, "Bull.Chem.Soc.Jpn." 51, 1978), It can obtain with synthesis methods, such as the approach (for example, "J.Org.Chem.", 52, 4296, 1987) of compounding using an aryl tin compound.

[0111] The condensed multi-ring compound shown by the general formula [I] of this invention - the general formula [VII] is a compound which was excellent in electronic transportability, the luminescence, and endurance compared with the conventional compound, it is useful as an electronic transportation layer and a luminous layer especially, and the layer containing the organic compound of an organic light emitting device and the layer formed by the vacuum deposition method, the solution applying method, etc. are [that crystallization etc. cannot take place easily] excellent in stability with the passage of time.

[0112] Next, the organic light emitting device of this invention is explained to a detail.

[0113] The organic light emitting device of this invention is characterized by the thing of the condensed multi-ring compound in which at least one layer of the layers containing said organic compound is shown by the general formula [I] - the general formula [VII] for which a kind is contained at least in the organic light emitting device which has at least a layer containing the electrode of a pair which consists of an anode plate and cathode, and 1 or two or more organic compounds which were ****(ed) by inter-electrode [of this pair].

[0114] The organic light emitting device of this invention has at least the desirable thing of said condensed multi-ring compound for which an electronic transportation layer or a luminous layer contains a kind at least among the layers containing an organic compound.

[0115] In the organic light emitting device of this invention, the condensed multi-ring compound shown by the above-mentioned general formula [I] - the general formula [VII] is formed between an anode plate and cathode by the vacuum deposition method or the solution applying method. The thickness of the organic layer is thinner than 10 micrometers, and it is preferably desirable to thin-film-ize in thickness of 0.01-0.5 micrometers more preferably 0.5 micrometers or less. In addition, this thickness is the thickness per each class.

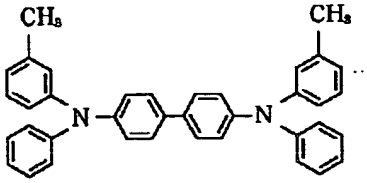
[0116] An example with the organic desirable light emitting device of this invention is shown in drawing 1 - drawing 6 .

[0117] Drawing 1 is the sectional view showing an example of the organic light emitting device of this invention. Drawing 1 is the thing of a configuration of having formed an anode plate 2, a luminous layer 3, and cathode 4 one by one on the substrate 1. The light emitting device used here is useful, when it is single and has hole transportation ability, electron transportation ability, and the luminescent engine performance by itself, or when mixing and using the compound which has each property.

[0118] Drawing 2 is the sectional view showing other examples in the organic light emitting device of this invention. Drawing 2 is the thing of a configuration of having formed an anode plate 2, the hole transportation layer 5, the electronic transportation layer 6, and cathode 4 one by one on the substrate 1. in this case, photogene -- hole transportability -- or any of electronic transportability -- or it is useful, when using for each layer the ingredient which has both functions and using combining the mere hole transportation matter or the electronic transportation matter without the luminescence. Moreover, a luminous layer 3 consists in this case of either the hole transportation layer 5 or the electronic transportation layer 6.

[0119] Drawing 3 is the sectional view showing other examples in the organic light emitting device of this invention. Drawing 3 is the thing of a configuration of having formed an anode plate 2, the hole transportation layer 5, a luminous layer 3, the electronic transportation layer 6, and cathode 4 one by one on the substrate 1. Since the various compounds which differ in luminescence wavelength can be used while this separating the function of carrier transportation and luminescence, and combining it hole transportability, electronic transportability, a compound with each luminescent property, and timely, using it and its degree of freedom of ingredient selection increasing extremely, diversification of a luminescent color phase is attained.
[0120] Furthermore, it also becomes possible to confine each carrier or an exciton in a central luminous layer effectively, and to aim at improvement in luminous efficiency.
[0121] Drawing 4 is the sectional view showing other examples in the organic light emitting device of this invention. It is the configuration which inserted the hole impregnation layer 7 in the anode plate side to drawing 3 , and drawing 4 has effectiveness in an adhesion improvement of an anode plate and a hole transportation layer or an injectional improvement of a hole, and is effective for low-battery-izing.
[0122] Drawing 5 and drawing 6 are the sectional views showing other examples in the organic light emitting device of this invention. Drawing 5 and drawing 6 are the configurations which inserted the layer (hole blocking layer 8) which checks escaping from a hole or an exciton (exciton) to a cathode side to drawing 3 and drawing 4 between the luminous layer and the electronic transportation layer. Ionization potential By using a very high compound as a hole blocking layer 8, it is a configuration effective for improvement in luminous efficiency.
[0123] However, drawing 1 - drawing 6 are to the last very fundamental component configurations, and the configuration of the organic light emitting device using the compound of this invention is not limited to these. For example, the glue line or interference layer which prepares an insulating layer in an electrode and an organic layer interface is prepared. A hole transportation layer consists of two-layer [from which ionization potential differs]. **** -- various lamination can be taken.
[0124] The condensed multi-ring compound shown by the general formula [I] used for this invention - the general formula [VII] is a compound which was excellent in electronic transportability, the luminescence, and endurance compared with the conventional compound, and can be used with any gestalt of drawing 1 - drawing 6 .
[0125] Especially the organic layer using the condensed multi-ring compound of this invention is useful as an electronic transportation layer and a luminous layer, and the layer formed by the vacuum deposition method, the solution applying method, etc. is [that crystallization etc. cannot take place easily] excellent in stability with the passage of time.
[0126] Although the condensed multi-ring compound shown by the general formula [I] - the general formula [VII] as a constituent of an electronic transportation layer and a luminous layer is used for this invention, a hole transportability compound, a luminescent compound, or an electronic transportability compound known until now can also be used for it together if needed.
[0127] These examples of a compound are given to below.
[0128]
[External Character 84]

ホール輸送性化合物



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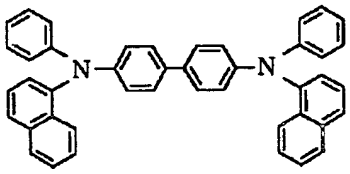
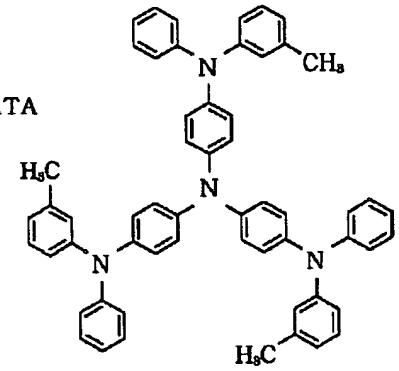
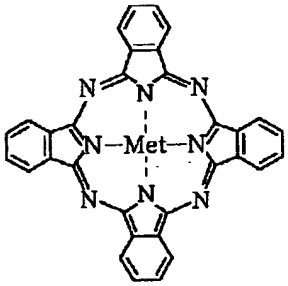


a－NPD



m－MTDATA

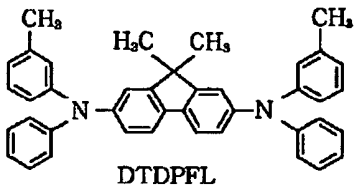


Met－Pc

Met＝Cu，Mg，AlCl，TiO_2，$SiCl_2$ 等

[0129]
[External Character 85]

ホール輸送性化合物



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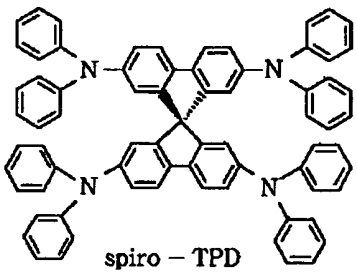
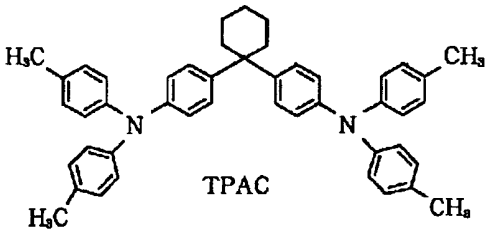


spiro－TPD



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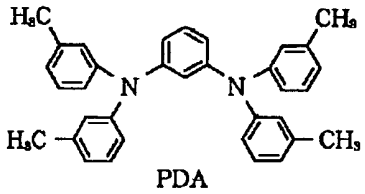
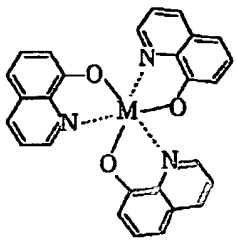


PDA

[0130]
[External Character 86]

電子輸送性発光材料



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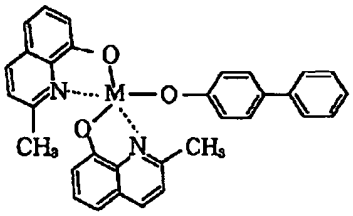

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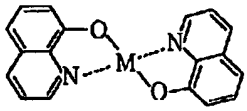

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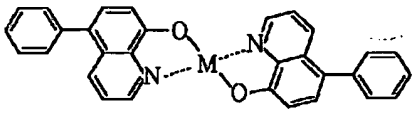

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[0131]
[External Character 87]

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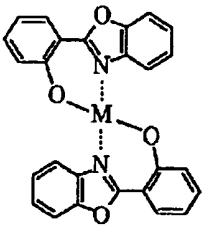

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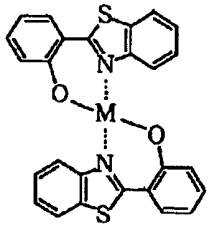

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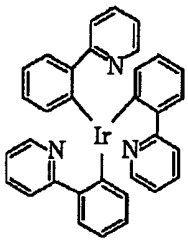

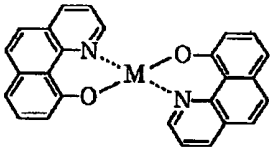

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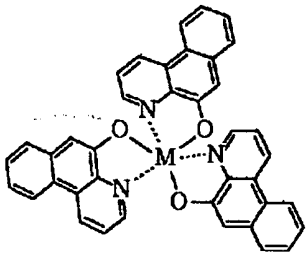

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[0132]
[External Character 88]

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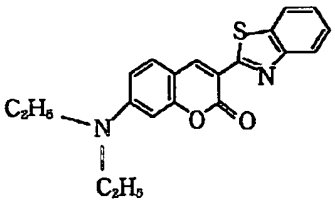
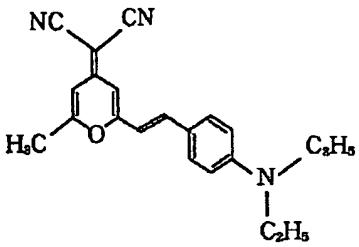


Coumarin 6



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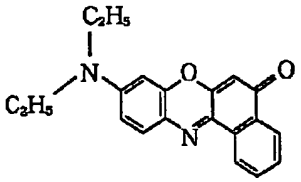

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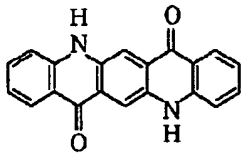

Quinacridone

[0133]
[External Character 89]

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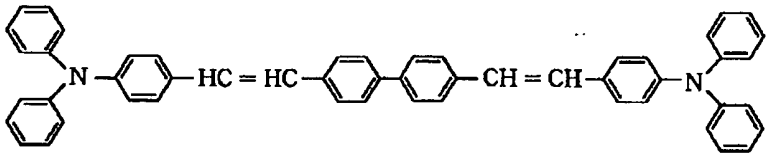
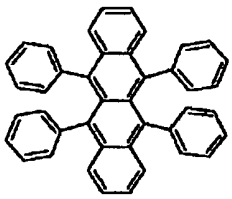
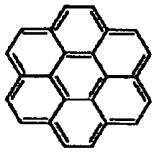


DPABVi



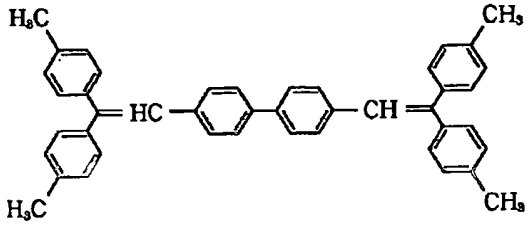
Rubrene

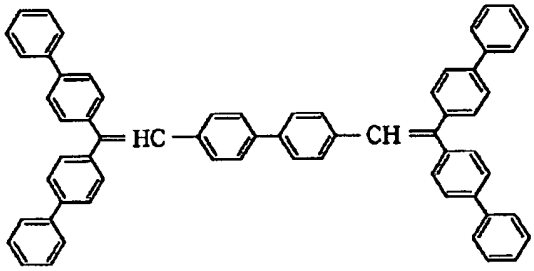


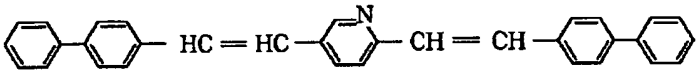
Coronene

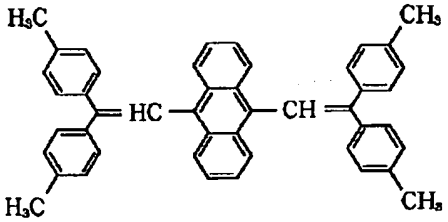
[0134]
[External Character 90]

発光層マトリックス材料および電子輸送材料









[0135]
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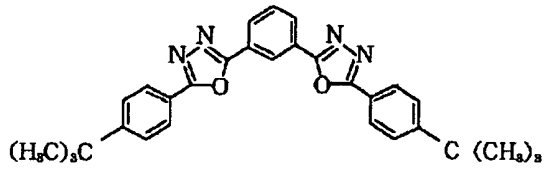
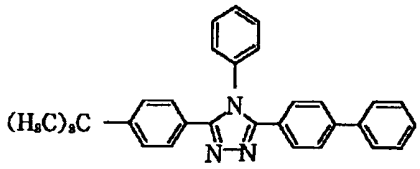
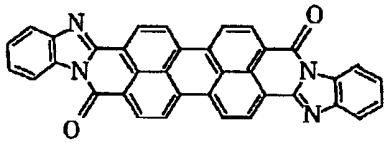
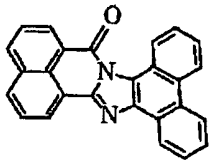
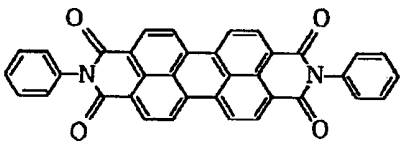
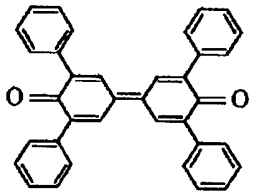






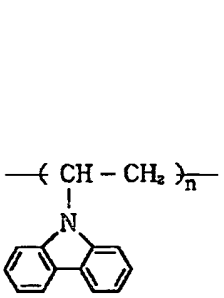




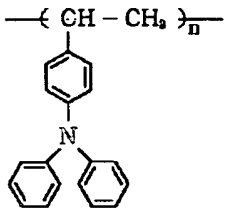


[0136]
[External Character 92]

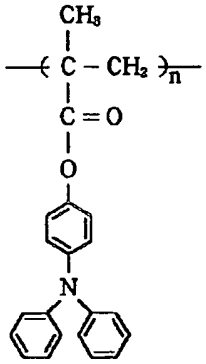
ポリマー系ホール輸送性材料



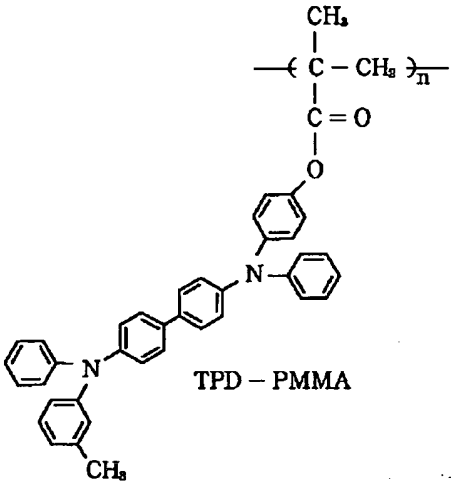
PVCz



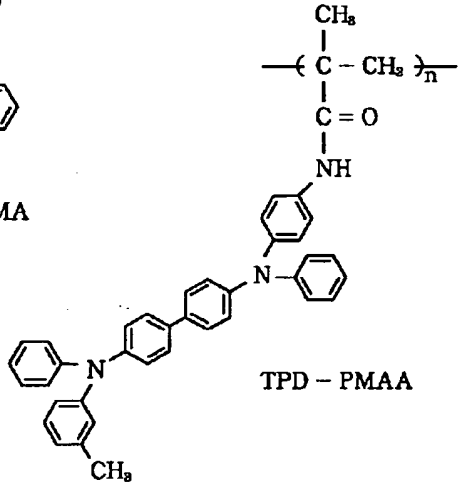
DPA – PS



TPA – PMMA



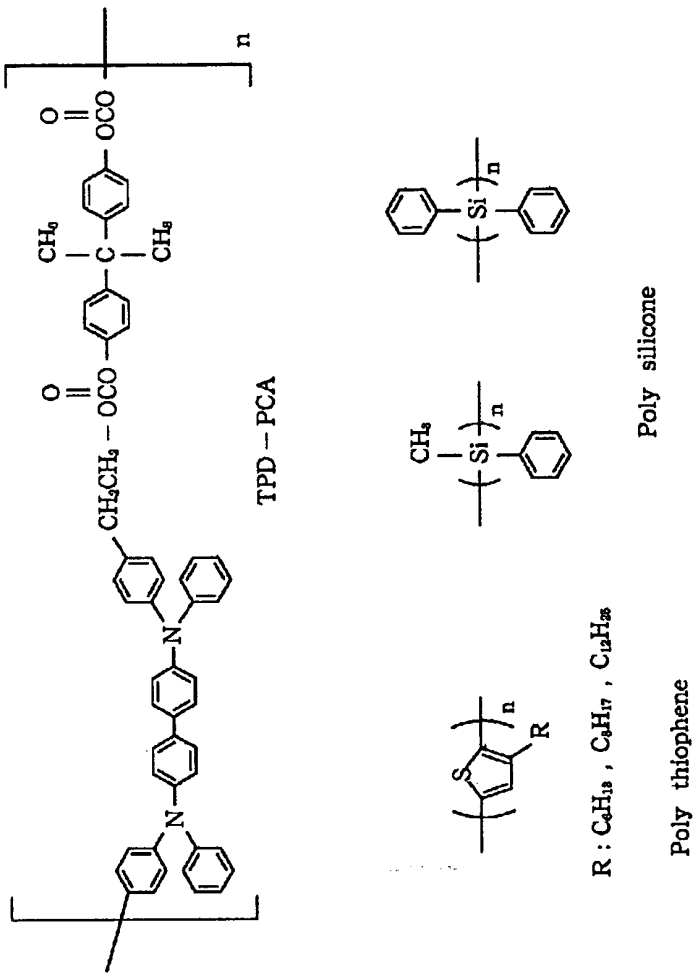
TPD – PMMA



TPD – PMAA

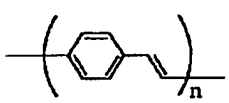
[0137]
[External Character 93]

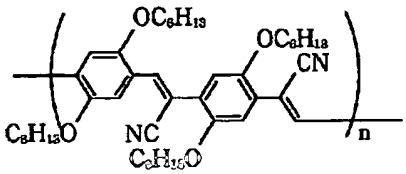
ポリマー系ホール輸送性材料

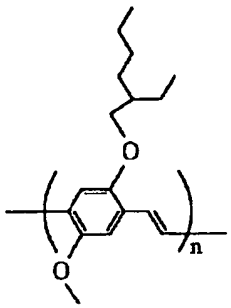


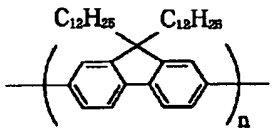
[0138]
[External Character 94]

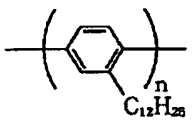
ポリマー系発光材料および電荷輸送性材料

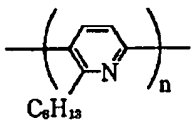












[0139] In the organic light emitting device of this invention, generally, it is made to dissolve in a vacuum deposition method or a suitable solvent, and the layer containing the layer containing the condensed multi-ring compound shown by the general formula [I] - the general formula [VII] and other organic compounds forms a thin film by the applying method. When forming membranes especially by the applying method, the film can also be formed combining suitable binding resin.

[0140] Although it can choose from bending resin wide range as the above-mentioned binding resin, for example, polyvinyl-carbazole resin, polycarbonate resin, polyester resin, polyarylate resin, polystyrene resin, acrylic resin, methacrylic resin, butyral resin, polyvinyl-acetal resin, diallyl phthalate resin, phenol resin, an epoxy resin, silicone resin, polysulfone resin, a urea-resin, etc. are mentioned, it is not limited to these. moreover -- as that these are independent or a copolymer polymer -- one sort -- or two or more sorts may be mixed.

[0141] What has as big a work function as an anode material as possible is good, for example, metallic oxides, such as metal simple substances, such as gold, platinum, nickel, palladium, cobalt, a selenium, and vanadium, or these alloys, tin oxide, a zinc oxide, a tin oxide indium (ITO), and a zinc oxide indium, can be used. Moreover, conductive polymers, such as the poly aniline, polypyrrole, the poly thiophene, and a polyphenylene sulfide, can also be used. Such electrode material may be used independently and can also be used together. [two or more]

[0142] On the other hand, as a cathode material, the small thing of a work function is good and can use as a metal simple substance or two or more alloys, such as a lithium, sodium, a potassium, calcium, magnesium, aluminum, an indium, silver, lead, tin, and chromium. Use of metal oxidation, such as a tin oxide indium (ITO), is also possible. Moreover, a configuration is much more sufficient as cathode, and it can also take a multilayer configuration.

[0143] Especially as a substrate used by this invention, although it does not limit, transparency substrates, such as opaque substrates, such as a metal substrate and a substrate made from the ceramics, glass, a quartz, and a sheet plastic, are used. Moreover, it is also possible to use the color filter film, the fluorescence color conversion filter film, the dielectric reflective film, etc. for a substrate, and to control coloring light.

[0144] In addition, to the created component, a protective layer or a closure layer can also be prepared in order to prevent contact with oxygen, moisture, etc. As a protective layer, a photo-setting resin etc. is mentioned to poly membrane pans, such as inorganic material film, such as a diamond thin film, a metallic oxide, and a metal nitride, fluorine resin, poly paraxylene, polyethylene, silicone resin, and polystyrene resin. Moreover, glass, a gas impermeable film, a metal, etc. can be covered and packaging of the component itself can also be carried out with suitable closure resin.

[0145] By the way, white luminescence is also possible by making the organic light emitting device of this invention contain a yellow luminescent material. For example, it is realizable by making a hole transportation layer contain the rubrene which is a yellow luminescent material. An example 64 describes concretely. What is necessary is just to decide suitably the weight ratio of the luminescent material in a hole transportation layer. Saying is because the amount of yellow luminescent material changes with the blue luminescence reinforcement and wavelength of a luminous layer. Moreover, in the case of an example 64, it is a hole transportation ingredient / rubrene =100 / 1 (weight ratio), for example.

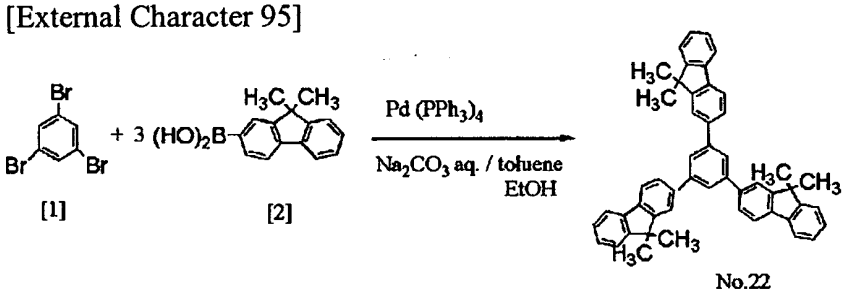
[0146]

[Example] Hereafter, although the example explains this invention still more concretely, this invention is not limited to these. Moreover, each thickness of an example is a value after desiccation.

[0147] (Synthetic example 1)

In a [composition of instantiation compound No.22] 500ml 3 Thu opening flask, 1, 3, 5-TORIBUROMO benzene [1] 0.8g (2.52mmol), Boron acid [2] 3.0g (12.6mmol), toluene 160ml, and ethanol 80ml are put in. The water solution of 15g of sodium carbonates and 75g of water was dropped under stirring at the room temperature among nitrogen-gas-atmosphere mind, and, subsequently tetrakis (triphenyl phosphine) palladium (0)0.44g (0.378mmol) was added. After stirring at a room temperature for 30 minutes, the temperature up was carried out to 77 degrees C, and stirring was performed for 3 hours. Chloroform extracted the organic layer after a reaction, anhydrous sodium sulfate refined with the silica gel column (hexane + toluene mixing expansion solvent) after desiccation, and instantiation compound No.22 (white crystal) 1.27g was obtained. (77% of yield)

[External Character 95]

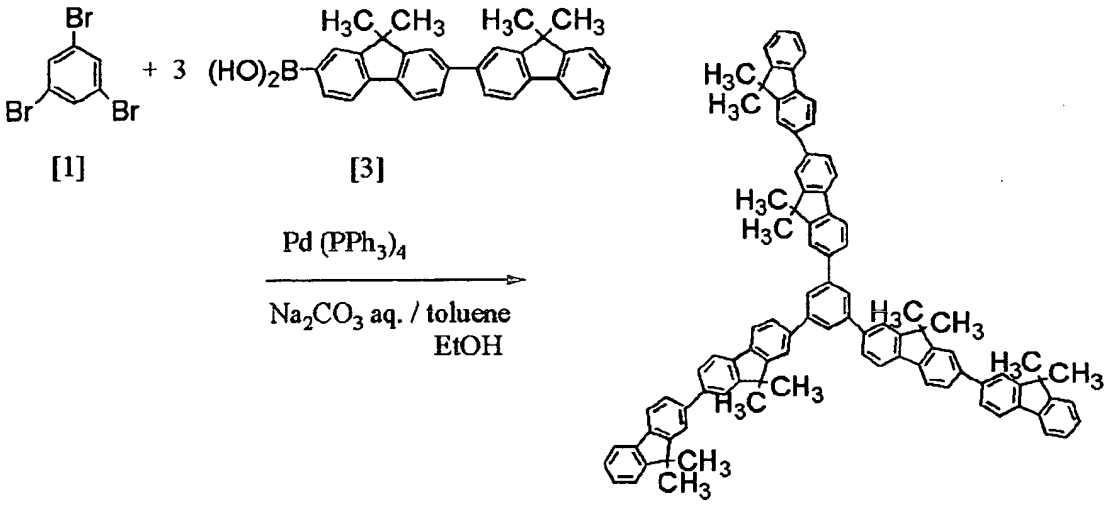


[1] [2] No.22

[0148] (Synthetic example 2)

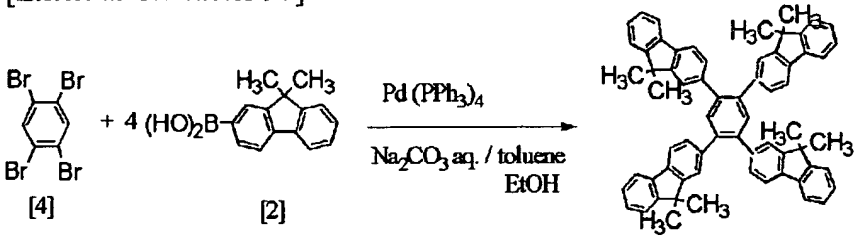
In a [composition of instantiation compound No.64] 500ml 3 Thu opening flask, 1, 3, 5-TORIBUROMO benzene [1] 0.8g (2.52mmol), Boron acid [3] 4.8g (12.6mmol), toluene 160ml, and ethanol 80ml are put in. The water solution of 15g of sodium carbonates and 75g of water was dropped under stirring at the room temperature among nitrogen-gas-atmosphere mind, and, subsequently tetrakis (triphenyl phosphine) palladium (0)0.44g (0.378mmol) was added. After stirring at a room temperature for 30 minutes, the temperature up was carried out to 77 degrees C, and stirring was performed for 3 hours. Chloroform extracted the organic layer after a reaction, anhydrous sodium sulfate refined with the silica gel column (hexane + toluene mixing expansion solvent) after desiccation, and instantiation compound No.64 (white crystal) 2.00g was obtained. (73% of yield)

[External Character 96]



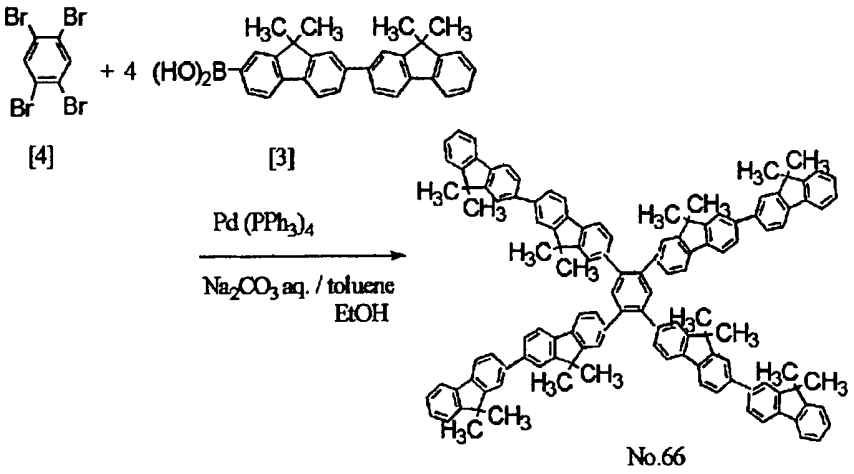
No.64

[0149] (Synthetic example 3)
In a [composition of instantiation compound No.65] 500ml 3 Thu opening flask, 1, 2, 4, 5-tetrabromo benzene [4]0.75g (1.88mmol), Boron acid [2] 3.0g (12.6mmol), toluene 160ml, and ethanol 80ml are put in. The water solution of 15g of sodium carbonates and 75g of water was dropped under stirring at the room temperature among nitrogen-gas-atmosphere mind, and, subsequently tetrakis (triphenyl phosphine) palladium (0)0.43g (0.376mmol) was added. After stirring at a room temperature for 30 minutes, the temperature up was carried out to 77 degrees C, and stirring was performed for 5 hours. Chloroform extracted the organic layer after a reaction, anhydrous sodium sulfate refined with the silica gel column (hexane + toluene mixing expansion solvent) after desiccation, and instantiation compound No.65 (white crystal) 1.41g was obtained. (88% of yield)
[External Character 97]

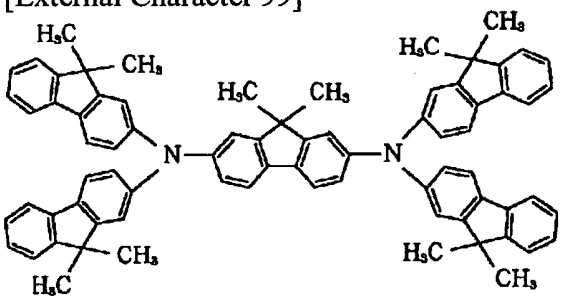


No.65

[0150] (Synthetic example 4)
In a [composition of instantiation compound No.66] 500ml 3 Thu opening flask, 1, 2, 4, 5-tetrabromo benzene [4]0.75g (1.88mmol), Boron acid [3] 4.8g (12.6mmol), toluene 160ml, and ethanol 80ml are put in. The water solution of 15g of sodium carbonates and 75g of water was dropped under stirring at the room temperature among nitrogen-gas-atmosphere mind, and, subsequently tetrakis (triphenyl phosphine) palladium (0)0.43g (0.376mmol) was added. After stirring at a room temperature for 30 minutes, the temperature up was carried out to 77 degrees C, and stirring was performed for 5 hours. Chloroform extracted the organic layer after a reaction, anhydrous sodium sulfate refined with the silica gel column (hexane + toluene mixing expansion solvent) after desiccation, and instantiation compound No.66 (white crystal) 1.88g was obtained. (70% of yield)
[External Character 98]



[0151] (Example 1) The organic light emitting device of the structure shown in drawing 2 was created.
[0152] On the glass substrate (substrate with a thickness of 0.7mm) as a substrate 1, what formed the tin oxide indium (ITO) as an anode plate 2 by 120nm thickness in the spatter was used as a transparent conductive support substrate. Sequential ultrasonic cleaning of this was carried out by the acetone and isopropyl alcohol (IPA), and, subsequently it dried after boiling washing in IPA. Furthermore, what carried out UV / ozone washing was used as a transparent conductive support substrate.
[0153] On the transparent conductive support substrate, the chloroform solution of the compound shown with the following structure expression was formed by 30nm thickness with the spin coat method, and the hole transportation layer 5 was formed.
[0154]
[External Character 99]

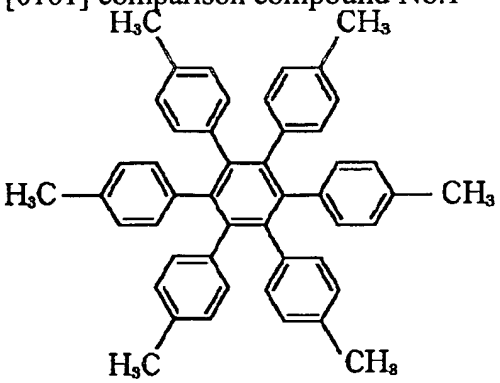


[0155] The condensed multi-ring compound furthermore shown by instantiation compound No.1 was formed by 50nm thickness with the vacuum deposition method, and the electronic transportation layer 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0156] Next, the metal layer membrane with a thickness of 150nm was formed with the vacuum deposition method on the above-mentioned organic layer using the vacuum evaporationo ingredient which is the alloy which consists of aluminum and a lithium (lithium concentration 1 atom %) as cathode 4. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 nm/sec.
[0157] Thus, when an ITO electrode (anode plate 2) is used the obtained component, a positive electrode and an aluminum-Li electrode (cathode 4) are used as a negative electrode and the direct current voltage of 10V is impressed, they are 9.0 mA/cm2. A current flows for a component with current density, and it is 750 cd/m2. Blue luminescence was observed by brightness.
[0158] furthermore, the bottom of nitrogen-gas-atmosphere mind -- current density -- 7.0mA/cm2 the place which maintained and impressed the electrical potential difference for 100 hours -- initial brightness 550 cd/m2 from -- 100 hours after 470 cd/m2 Brightness degradation was small.
[0159] (Examples 2-15) Replaced with instantiation compound No.1, and instantiation compound No.5, and 10, 16, 19,

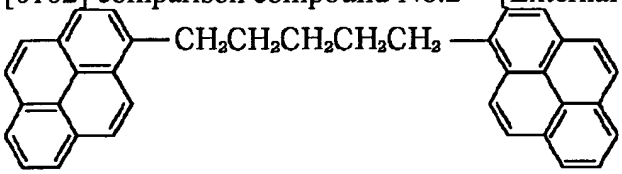
24, 25, 31, 36, 39, 43, 46, 51, 58 and 63 were used, and also the component was created like the example 1, and same evaluation was performed. The result is shown in Table 1.

[0160] (Examples 1-8 of a comparison) It replaced with instantiation compound No.1, and the compound shown with the following structure expression was used, and also the component was created like the example 1, and same evaluation was performed. The result is shown in Table 2.

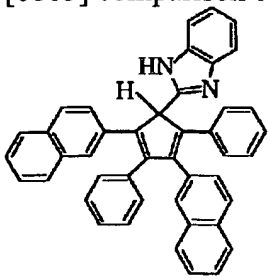
[0161] comparison compound No.1 -- [External Character 100]



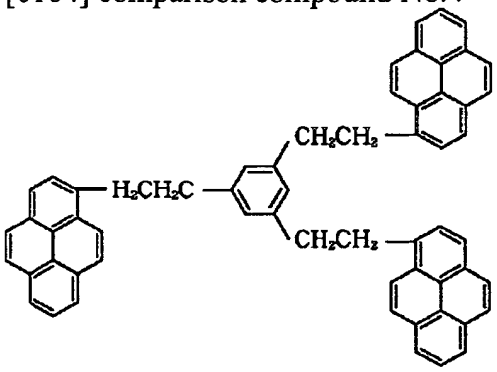
[0162] comparison compound No.2 -- [External Character 101]



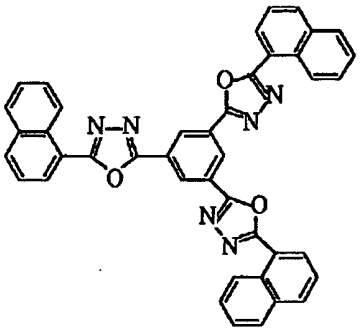
[0163] comparison compound No.3 -- [External Character 102]



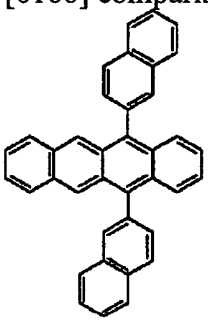
[0164] comparison compound No.4 -- [External Character 103]



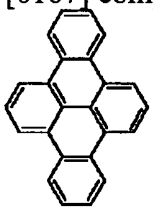
[0165] comparison compound No.5 -- [External Character 104]



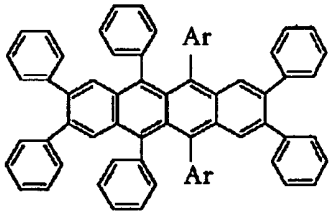
[0166] comparison compound No.6 -- [External Character 105]

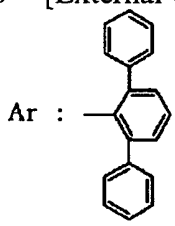


[0167] comparison compound No.7 -- [External Character 106]



[0168] comparison compound No.8 -- [External Character 107]





[0169]
[Table 1]

表 1

実施例 No.	例示化合物 No.	初期		耐久（電流密度 7.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
実施例 1	1	10	750	550	470
実施例 2	5	10	640	480	440
実施例 3	10	10	670	510	470
実施例 4	16	10	1220	1130	810
実施例 5	19	10	880	690	610
実施例 6	24	10	560	530	430
実施例 7	25	10	920	780	650
実施例 8	31	10	960	830	740
実施例 9	36	10	580	490	430
実施例10	39	10	660	520	460
実施例 11	43	10	570	510	440
実施例 12	46	10	720	570	510
実施例 13	51	10	710	550	490
実施例 14	58	10	1100	980	800
実施例 15	63	10	650	520	450

[0170]
[Table 2]

表 2

比較例 No.	例示化合物 No.	初期		耐久（電流密度 7.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
比較例 1	比較1	10	140	100	10
比較例 2	比較2	10	70	60	発光せず
比較例 3	比較3	10	90	70	発光せず
比較例 4	比較4	10	80	70	発光せず
比較例 5	比較5	10	150	90	発光せず
比較例 6	比較6	10	290	200	40
比較例 7	比較7	10	190	160	20
比較例 8	比較8	10	320	240	80

[0171] (Example 16) The organic light emitting device of the structure shown in drawing 3 was created.
[0172] The hole transportation layer 5 was formed on the transparent conductive support substrate like the example 1.
[0173] The condensed multi-ring compound furthermore shown by instantiation compound No.4 was formed by 20nm thickness with the vacuum deposition method, and the luminous layer 3 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0174] Furthermore, aluminum tris quinolinol Alg (tris - (8-hydroxyquinoline)) aluminum was formed by 40nm thickness with the vacuum deposition method, and the electronic transportation layer 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0175] Next, the metal layer membrane with a thickness of 150nm was formed with the vacuum deposition method on the above-mentioned organic layer as cathode 4 using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1 atom %), and the organic light emitting device of the structure shown in drawing 3 was created. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 nm/sec.
[0176] Thus, when an ITO electrode (anode plate 2) is used the obtained component, a positive electrode and an aluminum-Li electrode (cathode 4) are used as a negative electrode and the direct current voltage of 8V is impressed, they are 8.1 mA/cm2. A current flows for a component with current density, and it is 3980 cd/m2. Blue luminescence was observed by brightness.
[0177] furthermore, the bottom of nitrogen-gas-atmosphere mind -- current density -- 7.0mA/cm2 the place which maintained and impressed the electrical potential difference for 100 hours -- initial brightness 3090 cd/m2 from -- 100 hours after 2600 cd/m2 Brightness degradation was small.
[0178] (Examples 17-30) Replaced with instantiation compound No.4, and instantiation compound No.6, and 11, 14, 18, 22, 27, 29, 35, 40, 42, 47, 49, 52 and 62 were used, and also the component was created like the example 16, and same evaluation was performed. The result is shown in Table 3.
[0179] (Examples 9-16 of a comparison) Replaced with instantiation compound No.4, and comparison compound No.1, and 2, 3, 4, 5, 6, 7 and 8 were used, and also the component was created like the example 16, and same evaluation was performed. The result is shown in Table 4.
[0180]

[Table 3]

表 3

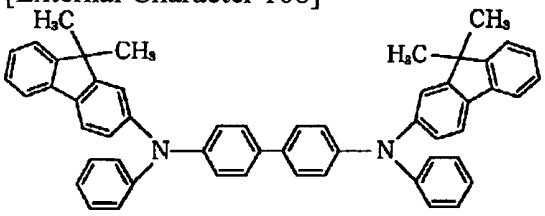
実施例 No.	例示化合物 No.	初期		耐久（電流密度 7.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
実施例 16	4	8	3980	3090	2600
実施例 17	6	8	4140	3470	2480
実施例 18	11	8	7370	6510	4860
実施例 19	14	8	5320	4130	2990
実施例 20	18	8	7050	6600	5210
実施例 21	22	8	5560	4430	3310
実施例 22	27	8	5920	4790	3600
実施例 23	29	8	7760	7000	4940
実施例 24	35	8	3170	2770	2030
実施例 25	40	8	5160	4410	3200
実施例 26	42	8	6010	5300	4290
実施例 27	47	8	6990	6570	5100
実施例 28	49	8	7500	6380	5290
実施例 29	52	8	5300	4680	3800
実施例 30	62	8	4950	4000	3350

[0181]
[Table 4]

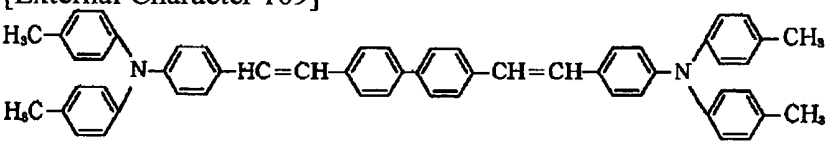
表 4

比較例 No.	例示化合物 No.	初期		耐久（電流密度 7.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
比較例 9	比較1	8	640	450	60
比較例 10	比較2	8	470	430	発光せず
比較例 11	比較3	8	340	270	発光せず
比較例 12	比較4	8	490	420	発光せず
比較例 13	比較5	8	650	490	発光せず
比較例 14	比較6	8	1700	1000	140
比較例 15	比較7	8	1180	860	90
比較例 16	比較8	8	2120	1240	360

[0182] (Example 31) The organic light emitting device of the structure shown in drawing 3 was created.
[0183] On the same transparent conductive support substrate as an example 1, the chloroform solution of the compound shown with the following structure expression was formed by 20nm thickness with the spin coat method, and the hole transportation layer 5 was formed.
[0184]
[External Character 108]



[0185] The condensed multi-ring compound (weight ratio 1:50) shown by the compound furthermore shown with the following structure expression and instantiation compound No.2 is formed by 20nm thickness with a vacuum deposition method. It carried out and the luminous layer 3 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0186]
[External Character 109]



[0187] Furthermore, aluminum tris quinolinol was formed by 40nm thickness with the vacuum deposition method, and the electronic transportation layer 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0188] Next, the metal layer membrane with a thickness of 150nm was formed with the vacuum deposition method on the above-mentioned organic layer as cathode 4 using the vacuum evaporationo ingredient which consists of aluminum

and a lithium (lithium concentration 1 atom %), and the organic light emitting device of the structure shown in drawing 3 was created. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 nm/sec.

[0189] Thus, when an ITO electrode (anode plate 2) is used the obtained component, a positive electrode and an aluminum-Li electrode (cathode 4) are used as a negative electrode and the direct current voltage of 8V is impressed, they are 8.5 mA/cm2. A current flows for a component with current density, and it is 46500 cd/m2. Luminescence of blue white was observed by brightness.

[0190] furthermore, the bottom of nitrogen-gas-atmosphere mind -- current density -- 5.0mA/cm2 the place which maintained and impressed the electrical potential difference for 100 hours -- initial brightness 22500 cd/m2 from -- 100 hours after 17600 cd/m2 Brightness degradation was small.

[0191] (Examples 32-45) Replaced with instantiation compound No.2, and instantiation compound No.7, and 9, 15, 17, 23, 28, 32, 34, 38, 41, 45, 50, 53 and 56 were used, and also the component was created like the example 31, and same evaluation was performed. The result is shown in Table 5.

[0192] (Examples 17-24 of a comparison) Replaced with instantiation compound No.2, and comparison compound No.1, and 2, 3, 4, 5, 6, 7 and 8 were used, and also the component was created like the example 31, and same evaluation was performed. The result is shown in Table 6.

[0193]

[Table 5]

表 5

実施例 No.	例示化合物 No.	初期		耐久（電流密度 5.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後輝度 (cd／m²)
実施例 31	2	8	46500	22500	17600
実施例 32	7	8	24300	13500	10900
実施例 33	9	8	78300	39000	32100
実施例 34	15	8	66000	35400	29800
実施例 35	17	8	69600	37000	33300
実施例 36	23	8	45600	23000	18500
実施例 37	28	8	55200	29000	25600
実施例 38	32	8	67700	37000	30800
実施例 39	34	8	43200	24000	16500
実施例 40	38	8	41000	20000	15500
実施例 41	41	8	46700	25300	20900
実施例 42	45	8	59800	34100	25000
実施例 43	50	8	39700	26400	22000
実施例 44	53	8	62300	34000	28700
実施例 45	56	8	44300	26800	20800

[0194]
[Table 6]

表 6

比較例 No.	例示化合物 No.	初期		耐久（電流密度 5.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
比較例 17	比較1	8	1190	650	130
比較例 18	比較2	8	770	460	発光せず
比較例 19	比較3	8	650	390	発光せず
比較例 20	比較4	8	690	390	発光せず
比較例 21	比較5	8	1250	880	140
比較例 22	比較6	8	5700	2610	870
比較例 23	比較7	8	3180	1820	760
比較例 24	比較8	8	7220	3540	1360

[0195] (Example 46) The organic light emitting device of the structure shown in drawing 5 was created.
[0196] The hole transportation layer 5 was formed on the transparent conductive support substrate like the example 31. After forming rubrene and aluminum tris quinolinol (weight ratio 1:20) by 20nm thickness with the vacuum deposition method furthermore and forming a luminous layer 3, the condensed multi-ring compound shown by instantiation compound No.3 was formed by 10nm thickness with the vacuum deposition method, and the hole / exciton blocking layer 8 was formed. Furthermore, aluminum tris quinolinol was formed by 40nm thickness with the vacuum deposition method, and the electronic transportation layer 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec. This membrane formation condition is common to layers 3, 8, and 6.
[0197] Next, the metal layer membrane with a thickness of 150nm was formed with the vacuum deposition method on the above-mentioned organic layer as cathode 4 using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1 atom %), and the organic light emitting device of the structure shown in drawing 5 was created. Degree of vacuum at the time of vacuum evaporationo 1.0x10 to 4 Pa, and membrane formation rate Membranes were formed on condition that 1.0 - 1.2 nm/sec.
[0198] Thus, when an ITO electrode (anode plate 2) is used the obtained component, a positive electrode and an aluminum-Li electrode (cathode 4) are used as a negative electrode and the direct current voltage of 10V is impressed, they are 8.9 mA/cm2. A current flows for a component with current density, and it is 60200 cd/m2. Luminescence yellow-green by brightness was observed.
[0199] furthermore, the bottom of nitrogen-gas-atmosphere mind -- current density -- 7.0mA/cm2 the place which maintained and impressed the electrical potential difference for 100 hours -- initial brightness 38000 cd/m2 from -- 100 hours after 28700 cd/m2 Brightness degradation was small.
[0200] (Examples 47-60) Replaced with instantiation compound No.3, and instantiation compound No.8, and 13, 21, 30, 33, 37, 44, 48, 54, 55, 57, 59, 60 and 61 were used, and also the component was created like the example 46, and same evaluation was performed. The result is shown in Table 7.
[0201] (Examples 25-32 of a comparison) Replaced with instantiation compound No.3, and comparison compound No.1, and 2, 3, 4, 5, 6, 7 and 8 were used, and also the component was created like the example 46, and same evaluation was performed. The result is shown in Table 8.
[0202]

[Table 7]

表 7

実施例 No.	例示化合物 No.	初期		耐久（電流密度 7.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
実施例 46	3	10	60200	38000	28700
実施例 47	8	10	41000	24500	15500
実施例 48	13	10	62400	39300	30100
実施例 49	21	10	61100	38500	29900
実施例 50	30	10	79700	47000	34100
実施例 51	33	10	77600	45800	31200
実施例 52	37	10	42500	26000	15800
実施例 53	44	10	67700	37000	30800
実施例 54	48	10	80200	47000	34400
実施例 55	54	10	42900	24200	16500
実施例 56	55	10	76600	45300	31800
実施例 57	57	10	49900	27300	15000
実施例 58	59	10	39200	24400	15700
実施例 59	60	10	42500	28000	18700
実施例 60	61	10	42300	26300	17000

[0203]
[Table 8]

表 8

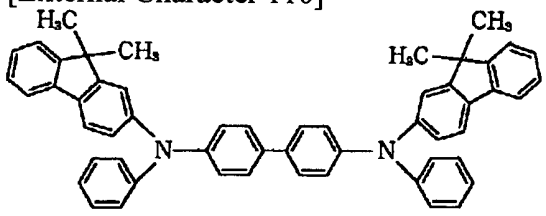
比較例 No.	例示化合物 No.	初期		耐久（電流密度 7.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
比較例 25	比較1	10	1020	660	120
比較例 26	比較2	10	750	420	発光せず
比較例 27	比較3	10	680	410	発光せず
比較例 28	比較4	10	690	420	発光せず
比較例 29	比較5	10	1050	750	210
比較例 30	比較6	10	5400	2200	770
比較例 31	比較7	10	2850	1600	560
比較例 32	比較8	10	8010	3670	910

[0204] (Example 61) The organic light emitting device of the structure shown in drawing 1 was created.
[0205] On the same transparent conductive support substrate as an example 1, the solution which dissolved 0.050g and Polly N-vinylcarbazole (weight average molecular weight = 63,000) 1.00g for the condensed multi-ring compound shown by instantiation compound No.12 in chloroform 80ml was formed to 120nm thickness with the spin coat method (rotational frequency = 2000rpm), and the organic layer (luminous layer 3) was formed.
[0206] Next, the metal layer membrane with a thickness of 150nm was formed with the vacuum deposition method on the above-mentioned organic layer as cathode 4 using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1 atom %), and the organic light emitting device of the structure shown in drawing 1 was created. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 nm/sec.
[0207] Thus, when an ITO electrode (anode plate 2) is used the obtained component, a positive electrode and an aluminum-Li electrode (cathode 4) are used as a negative electrode and the direct current voltage of 10V is impressed, they are 7.8 mA/cm2. A current flows for a component with current density, and it is 1250 cd/m2. Blue luminescence was observed by brightness.
[0208] furthermore, the bottom of nitrogen-gas-atmosphere mind -- current density -- 5.0mA/cm2 the place which maintained and impressed the electrical potential difference for 100 hours -- initial brightness 820 cd/m2 from -- 100 hours after 670 cd/m2 Brightness degradation was small.
[0209] (Examples 62-63) instantiation compound No.12 -- replacing with -- instantiation compound No. -- 20 and 26 were used, and also the component was created like the example 61, and same evaluation was performed. The result is shown in Table 9.
[0210] (Examples 33-40 of a comparison) Replaced with instantiation compound No.12, and comparison compound No.1, and 2, 3, 4, 5, 6, 7 and 8 were used, and also the component was created like the example 61, and same evaluation was performed. The result is shown in Table 9.
[0211]
[Table 9]

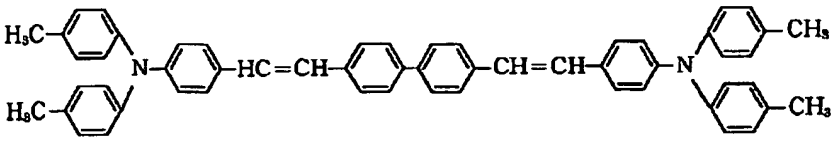
表 9

実施例, 比較例 No.	例示化合物 No.	初期		耐久（電流密度 5.0mA／cm²）	
		印加電圧 (V)	輝度 (cd／m²)	初期輝度 (cd／m²)	100時間後 輝度 (cd／m²)
実施例 61	12	10	1250	820	670
実施例 62	20	10	980	670	590
実施例 63	26	10	1070	740	610
比較例 33	比較1	10	230	150	発光せず
比較例 34	比較2	10	120	80	発光せず
比較例 35	比較3	10	90	70	発光せず
比較例 36	比較4	10	80	60	発光せず
比較例 37	比較5	10	250	150	発光せず
比較例 38	比較6	10	340	220	40
比較例 39	比較7	10	340	210	20
比較例 40	比較8	10	410	270	80

[0212] (Example 64) The organic light emitting device of the structure shown in drawing 3 was created.
[0213] On the same transparent conductive support substrate as an example 1, the rubrene (weight ratio 100:1) which is the luminescent material of the compound shown with the following structure expression and yellow was formed by 50nm thickness with the vacuum deposition method, and the hole transportation layer 5 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0214]
[External Character 110]



[0215] The condensed multi-ring compound (weight ratio 1:100) shown by the compound furthermore shown with the following structure expression and instantiation compound No.9 was formed by 20nm thickness with the vacuum deposition method, and the luminous layer 3 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0216]
[External Character 111]



[0217] Furthermore, aluminum tris quinolinol was formed by 30nm thickness with the vacuum deposition method, and the electronic transportation layer 6 was formed. The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 0.2 - 0.3 nm/sec.
[0218] Next, the metal layer membrane with a thickness of 150nm was formed with the vacuum deposition method on the above-mentioned organic layer as cathode 4 using the vacuum evaporationo ingredient which consists of aluminum and a lithium (lithium concentration 1.5 atom %). The degree of vacuum at the time of vacuum evaporationo formed 1.0x10 to 4 Pa, and a membrane formation rate on condition that 1.0 - 1.2 nm/sec.
[0219] Thus, when an ITO electrode (anode plate 2) is used the obtained component, a positive electrode and an aluminum-Li electrode (cathode 4) are used as a negative electrode and the direct current voltage of 8V is impressed, they are 100 mA/cm2. A current flows for a component with current density, and it is 11000 cd/m2. White luminescence was observed by brightness.
[0220] Moreover, when the direct current voltage of 15V is impressed, they are 2250 mA/cm2. A current flows for a component with current density, and it is 213000 cd/m2. White luminescence was observed by brightness.
[0221] (Examples 65-67) Replaced with instantiation compound No.1, and instantiation compound No.64, and 65 and 66 were used, and also the component was created like the example 1, and same evaluation was performed. The result is shown in Table 10.
[0222]
[Table 10]
表１０

実施例 No.	例示化合物 No.	初期		耐久（電流密度７．０ｍＡ／ｃｍ２）	
		印加電圧(V)	輝度(ｃｄ／ｍ２)	初期輝度(ｃｄ／ｍ２)	１００時間後輝度(ｃｄ／ｍ２)
65	64	10	1900	1500	1400
66	65	10	2400	1800	1600
67	66	10	1500	1400	1200

[0223] (Examples 68-70) Replaced with instantiation compound No.4, and instantiation compound No.64, and 65 and 66 were used, and also the component was created like the example 16, and same evaluation was performed. The result is shown in Table 11.
[0224]
[Table 11]

表１１

実施例 No.	例示化合物 No.	初期		耐久（電流密度７．０ｍＡ／ｃｍ２）	
		印加電圧(V)	輝度(ｃｄ／ｍ２)	初期輝度(ｃｄ／ｍ２)	１００時間後輝度(ｃｄ／ｍ２)
68	64	8	11000	9000	7000
69	65	8	14000	12500	9000
70	66	8	9500	8500	7000

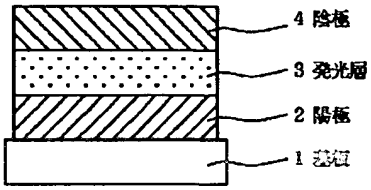
[0225] (Examples 71-74) The emission spectrum of the component created in the examples 21, 68, 69, and 70 was observed by MCPD-7000 (manufacturer: Otsuka Electronics, device name-hotal MCPD-7000 (Mult:Channel Photo Detector)), and the CIE chromaticity coordinate was measured. The result is shown in Table 11.
[0226]
[Table 12]
表１２

実施例 No.	素子の実施例 No.	例示化合物 No.	CIE 色度差表（X、Y）
71	21	22	(0.14、0.08)
72	68	64	(0.16、0.12)
73	69	65	(0.15、0.09)
74	70	66	(0.16、0.13)

[0227] These results showed that blue luminescence of the outstanding color purity was obtained. namely, the blue purity (CIE coordinate) of the Braun tube -- X and Y=0. -- it turned out that these examples are very close to the value of the blue of an ideal which has an ideal which are 14 and 0.08. Furthermore, these compound No.22 and each component which has 64, 65, and 66 were desirable also from the point of initial brightness and endurance.
[0228]
[Effect of the Invention] applied voltage with the organic light emitting device above low like explanation using the condensed multi-ring compound and it which are shown by the general formula [I] of this invention - the general formula [VII] -- high -- brightness luminescence is obtained and it excels also in endurance. The organic layer containing especially the condensed multi-ring compound of this invention is excellent as an electronic transportation layer or a luminous layer. Furthermore, it excels also as a hole / an exciton blocking layer.
[0229] Furthermore, it can create using vacuum deposition or the casting method, and creation of a component is also comparatively cheap and can create the component of a large area easily.

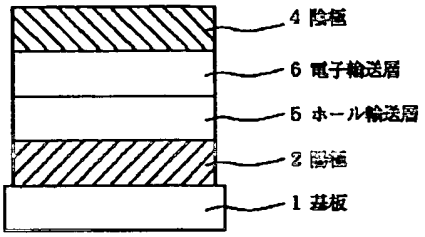
[Translation done.]

Drawing selection drawing 1



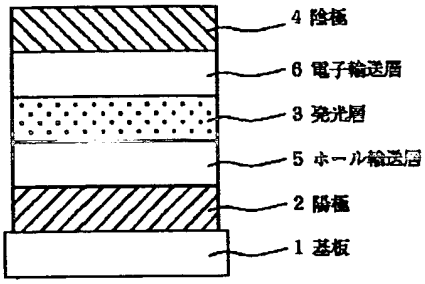
[Translation done.]

Drawing selection drawing 2



[Translation done.]

Drawing selection drawing 3



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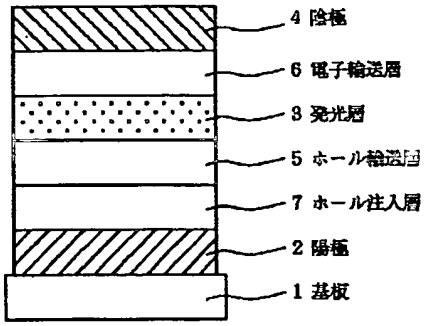
Drawing selection drawing 4



[Translation done.]

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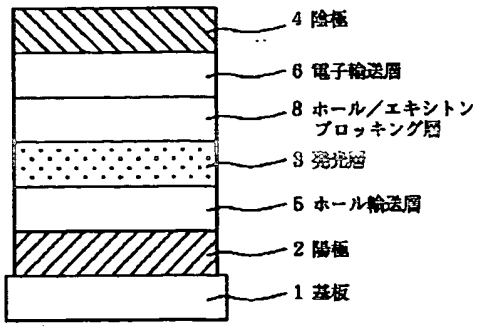

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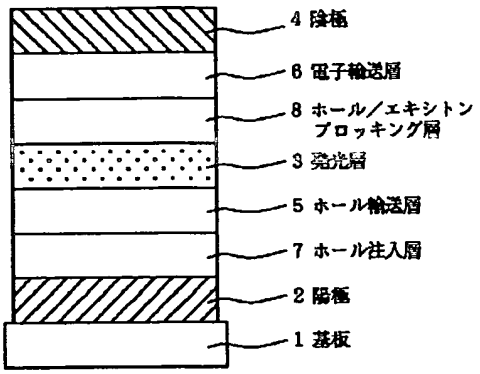
Drawing selection drawing 6



[Translation done.]